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THE UNIVERSITY OF ALBERTA

PERCEPTIONS OF PATIENTS, PHYSICIANS, AND NURSES REGARDING THE QUALITY OF LIFE OF INDIVIDUALS WITH END STAGE RENAL DISEASE

BY

ANITA E. MOLZAHN ©

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH IN
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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled "PERCEPTIONS OF PATIENTS, PHYSICIANS, AND NURSES REGARDING THE QUALITY OF LIFE OF INDIVIDUALS WITH END STAGE RENAL DISEASE" submitted by ANITA E. MOLZAHN in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

(Supervisor)

Sharon Warren

Roger W Evans

Date: August 31, 1989

DEDICATION

To Nigel who provided support and encouragement and to Wesley who provided necessary diversion.

Perceptions of Patients, Physicians, and Nurses Regarding the Quality of Life of Individuals with End Stage Renal Disease

Abstract

The purpose of this study was to explain the perceptions of physicians, nurses, and patients regarding the quality of life (QOL) of patients with end stage renal disease (ESRD). The sample consisted of 215 patients (96 with renal transplants, 52 receiving incenter hemodialysis, 37 receiving home hemodialysis and 30 receiving continuous ambulatory peritoneal dialysis) and their nurses and physicians.

Three instruments were used to measure quality of life: the Self-Anchoring Striving Scale (Cantril, 1965), the Index of Well-Being (Campbell, Converse, and Rodgers, 1976), and the Health State Utility Score - Time Trade Off Technique (Churchill, Morgan, and Torrance, 1984). As well, data were collected pertaining to the care providers' demographic characteristics, the patients' sociodemographic and medical characteristics, and the patients' health status, functional status, support and outlook.

The reliability and validity of the instruments were examined. There was some evidence for the discriminant and concurrent validity of the dependent measures.

It was found that there were some statistically significant differences between the mean scores between the groups. The nurses,

on average, rated the patients' QOL lower than did either the patients or the physicians. The correlations of nurses' and patients' scores ranged between .19 to .47. The correlations of physicians' and patients' scores ranged from .26 to .45. The correlations between nurses' and physicians' scores ranged from .35 to .49 on the various measures.

A series of multiple regression analyses were performed to explain the patients', nurses', and physicians' perceptions of the patients' QOL. Patients' perceptions of their quality of life could be predicted from their health status, outlook on life, and treatment modality (i.e., dialysis or transplant). Nurses' perceptions of their patients' quality of life could be predicted by the patients' educational background, the nurses' educational background, and the nurses' perceptions of the patients' functional status and outlook. Physicians' perceptions were more difficult to predict; physicians' perceptions of the patients' support were the only consistent predictors of their perceptions.

A series of models of patients', nurses', and physicians' perceptions regarding QOL of the patients with ESRD were developed and tested using LISREL. The patients' model, with some revisions, was shown to be consistent with the data collected for the study. The models of the nurses' and physicians' perceptions were not successful, and prompted a reconsideration of some of the theory underlying the early parts of the thesis.

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I. INTRODUCTION

The Problem

Since the introduction of chronic hemodialysis in 1962, the lives of many individuals with end stage renal disease (ESRD) have been prolonged. Initially, resources were very limited, and only a few medically and socially acceptable candidates were selected for treatment. Elderly individuals and diabetics were generally denied dialysis treatment (Fox & Swazey, 1974). Today, with the increase in resources, essentially all persons requiring dialysis are being offered treatment.

In Canada, at the end of 1984, 7219 patients were receiving care for chronic renal failure (Schriel, Silins, Hauser, Posen, & Coll, 1985, p. 29). Of these, 4053 were receiving some form of dialysis treatment; the remainder had renal transplants. New patients entered treatment programs for ESRD at a rate of 57.6 per million of population. Of these new patients, 25% were over 65 years of age. It is also of interest that diabetes was found to be the second most common cause of renal failure (after glomerulonephritis), accounting for 16% of the affected population. Quality of life issues arise frequently, particularly with elderly and diabetic patients (Annas, 1980; Kart, 1980). As a result, health care workers have become increasingly aware of quality of life issues.

Although health care professionals have become increasingly concerned about the quality of life of their patients, it is not clear whether patients' perceptions of their own quality of life (QOL) are congruent with those of their health care providers. Physicians and nurses generally believe that patients will concur with the care providers' assessments after the care providers have discussed the condition and treatment with them (the patients) (Maughton, 1982). In fact, it has been suggested that health care professionals have not performed their roles satisfactorily if patients do not concur with them (King, 1962). However, some literature suggests that perceptions of patients may differ from those of health care professionals.

In this study, the perceptions of patients, nurses, and physicians regarding the QOL of individuals with ESRD were examined. An attempt was made to compare and explain the perceptions of each of the groups.

Overall Purpose

The overall purpose of this study was to explain the perceptions of physicians, nurses, and patients regarding the QOL of individuals with ESRD.

Research Questions

The research questions were:

1. Are the measures of quality of life used in the study reliable and valid?

2. Do the physicians' and the nurses' perceptions of the QOL of their patients with ESRD differ from those of the patients themselves?

3. Do the physicians' perceptions of the QOL of the patients with ESRD differ from those of the nurses?

4. Do variables such as patients' age, sex, education, marital status, outlook, health status, functional status, support, length of experience with illness, length of experience with treatment, diagnosis, morbidity, and treatment modality explain the perceptions of patients with ESRD?

5. Do variables such as the care providers' age, sex, education, confidence in their QOL rating, and length of experience in their occupational role explain the perceptions of the health care providers?

6. Do variables such as patients' age, sex, education, length of experience with the illness, length of experience with the treatment, health status, functional status, treatment modality, and care givers' age, sex, education, confidence in their QOL rating, and length of experience in the occupational role explain the differences in perceptions between patients and care providers?

Significance of the Study

There is general agreement among health care providers that efforts should be made not only to prolong life, but to improve the QOL. In some health care institutions, committees deliberate on whether available treatments offer patients QOL or merely extend a life of agony (Lestz, 1977). This study examines the perceptions of health care professionals who are involved in making decisions that affect the QOL of their patients. It may be that perceptions of nurses differ from those of physicians. Similarly, it is possible that patients' perceptions vary from those of health care professionals. No study has yet systematically addressed this problem. It is important to understand similarities and differences in perceptions of quality of life. If differences in perceptions exist between groups, treatment, behavior, and communication may be affected. There are serious implications for patients, health care providers, and administrators. Furthermore, in most studies of QOL, only one measure of the concept is used, and that measure often lacks reliability and validity. This study will expand current knowledge by using three measures of QOL to describe the overall QOL of patients with ESRD. Through the use of a set of structural equation models (i.e., LISREL), this study will also add to the body of knowledge on measurement of QOL by offering the opportunity to closely examine the reliability and validity of these instruments.

Summary

The quality of life of patients with ESRD is of concern to many people, particularly to health professionals. However, it is possible that the perceptions of health care providers are not congruent with those of the patients. The research questions listed in this chapter pertain to describing and explaining the measurement structure of the variables, as well as the perceptions of patients, physicians and nurses regarding the QOL of patients with ESRD.

II. LITERATURE REVIEW

Introduction

The literature reviewed for this study focused on quality of life and perceptions of health care providers and patients regarding health and illness. Literature related to quality of life (QOL) is discussed under the following headings: conceptualization of QOL, QOL of patients with ESRD, and correlates of QOL. Literature relating to perceptions of health and illness is discussed under the following headings: congruence of perceptions of patients and care providers, discrepancies in perceptions of patients and care providers, factors affecting perceptions, and limitations in existing research.

Quality of Life

Conceptualization of Quality of Life

Quality of life has been conceptualized in many ways. Selected highlights from the literature are discussed under the headings: defining quality of life, types of quality of life models, common conceptualizations of quality of life (including those used by social scientists and health care professionals), and developments toward a theory of quality of life.

Defining Quality of Life

Schipper and Levitt (1985) stated, "The most difficult phase of evaluating quality of life is defining what is to be measured" (p.

1116). Numerous attempts have been made to define quality of life. Schuessler and Fisher (1985) stated that the term "quality" implies a range, from high to low, or from better to worse. However, they suggested that the term "life" is more difficult to define, since there are numerous dimensions to the concept. Andrews and Withey (1976) also recognized the complexity of the concept; in a review of the literature they identified 800 possible dimensions of quality of life. Many of these dimensions overlapped. They were able to reduce the list to 100 life areas.

Many definitions of quality of life have been proposed, incorporating various dimensions of "life". Despite this lack of agreement on a definition of quality of life, there is some agreement in the literature that quality of life is a multidimensional construct. According to Alexander and Willems (1981) the most crucial domains seem to be: physical well-being (or health), relationships with other people, social activities, personal development, recreation, economic circumstances, and safety. Schipper and Levitt (1985), oncology researchers, discussed four central elements of quality of life that are consistently identified in the literature: physical/occupational function, psychological state, sociability, and somatic discomfort. From these works, it would seem that some commmon elements of quality of life exist that should be included in any assessment. However, it is not always clear whether these elements are truly dimensions of quality of life or whether they are in fact predictors of the concept.

Despite the efforts to identify the numerous dimensions of QOL, most researchers attempt to sum (or otherwise aggregate) the scores on various dimensions to obtain a total or overall score. This would suggest that the emphasis is on an integrated assessment of a person's life. It seems that proponents of a multidimensional approach contradict themselves with the use of a single score (dimension) to describe quality of life. In this study, quality of life was conceptualized as a single dimension. This appears to be most appropriate since both popular and scientific references to quality of life generally imply a rating on a scale or continuum, from very high to very low.

In existing research pertaining to quality of life, no real efforts have been made to define the concept accurately or consistently (Diener, 1984). It is not entirely clear whether concepts such as happiness, well-being, life satisfaction and quality of life are similar, related, or identical concepts. Unfortunately, the terms are often used synomously, and further work is required to clarify the distinctions.

Types of Quality of Life Models

Several approaches have been taken to identify the dimensions of quality of life. Harwood (1976) suggested that there are three types of quality models: ascriptive, testimonial, and importance. An ascriptive model is based on a selection of indicators by a committee of experts, without input from the general public. The Economic

Council of Canada (1971) has developed one of the more comprehensive frameworks which illustrates the ascriptive approach. The components of quality of life in this model are: political (including individual rights and responsibilities, and national identity), social (including health, command over language skills, and environment), and economic (possessions, goods and services). Indicators for each component or dimension were selected from available statistical data bases, and used as measures of the concept.

Testimonial models are based on the subjective responses of individuals themselves and not on the judgements of experts. Using this approach, responses are obtained to various measures of the dimensions of quality of life. This type of model has been used extensively in the study of patient populations. The work of Andrews and Withey (1976) fits into this category. Some researchers (i.e., Campbell, Converse, and Rodgers, 1976) combine the testimonial approach with another approach (i.e., importance).

In importance models, people rank the importance of various quality of life components based on their attitudes and values. Actual ratings of individual quality of life are not done (as in the testimonial approach). Rather, a hierarchical approach is used to rank the value of aspects of quality of life. Harwood (1976) identified several "importance" studies which have demonstrated that health is ranked highest in importance to individuals, followed by employment and income, and then by environment, communication, and safety. It is interesting to note that many of the ascriptive approaches used to describe and compare the quality of life of people focus largely on income and environment, dimensions of quality of life that are of lesser importance to people than health.

Common Conceptualizations of Quality of Life

Several representative examples of conceptualizations of quality of life used in social sciences or health sciences research are discussed; most of these employ a testimonial approach. Although such conceptualizations may be considered subjective (rather than objective), it seems most reasonable to use direct measures of individuals' evaluations of their own well-being since "quality of life involves value judgements that are highly subjective" (Dubos, 1976).

Conceptualizations of quality of life have tended to focus on either life satisfaction or happiness. Atkinson (1979) described quality of life as a multidimensional concept of which life satisfaction is only one dimension; he did not identify the other dimensions of the concept. Life satisfaction is thought to be a more stable measure than happiness, since happiness seems to describe an emotional state, whereas satisfaction implies a cognitive judgement of a situation based on personal comparisons (Campbell, et al., 1976). The best known study using a satisfaction approach was the Quality of American Life study by Campbell, et al. (1976). They described a model that involved a global assessment of well-being as well as an assessment of satisfaction on a number of domains of quality of life. The domains studied, in decreasing order of importance (as perceived by the subjects) were: health, marriage, family life, national government, friendships, housing, job, community, religious faith, nonwork activities, financial situation, and organizations. These domain satisfaction scores explained 54% of the variance of the global measure of well-being. It was concluded that global reports of a sense of well-being meaningfully reflected a composite of feelings of satisfaction or dissatisfaction with a variety of specific life domains, despite the fact that a considerable proportion of variance was not accounted for.

Andrews and Withey (1976) also developed a testimonial model of perceived life quality using a satisfaction approach. They suggested that quality of life can be described on two levels, the "global" level and the "concern" levels. On the concern level, possible domains involving role situations, such as house, job, and family life were portrayed on one axis, and criteria relating to values, such as success, beauty, and fun were illustrated on the other axis. Both domains and criteria (i.e., the concerns) were thought to reflect an overall, or global sense of well-being. This additive model explained 50 to 60% of the variance in an index of overall life quality.

Kennedy, Northcott, and Kinzel (1977) used an approach similar to that of Campbell, et al. (1976) in their study of the quality of social life of Edmontonians. In addition to a measure of general satisfaction, they included measures relating to satisfaction with health, standard of living, family life, friendships, recreation, chidren's education, and pace of life. They were able to explain 45% of the variance in general satisfaction with the first five variables.

Happiness has been used less frequently than life satisfaction as an indicator of quality of life. However, happiness has been described and interpreted in many ways, and the meaning of this concept is not clear. In some studies, happiness is considered to be a transient emotional state; in other studies, it is described as an assessment of the fulfillment of goals or needs. For example, Shin and Johnson (1978) proposed a "theory of happiness", after a review of the philosophical and empirical literature. They proposed that happiness consists of: the possession of resources; the satisfaction of needs, wants and desires; participation in self-actualizing activities; and comparisons with others and past experiences. The theory suggests that happiness is primarily a product of the positive assessments of life situations and favorable comparisons of these life situations with the situations of others and the situations that have occurred in the past. The various personal characteristics and the resources under an individual's command influence happiness mostly through their effects on the processes of assessment and comparison. The researchers tested the model, with some success, using an existing data base.

The work of Bradburn (1969) has been widely cited in the quality of life literature; it has also been widely criticized. Bradburn hypothesized that happiness is really a global judgement that people make by comparing their negative affect with their positive affect. His Affect Balance Scale score is derived by subtracting the sum of negative items from the sum of positive items. Considering that Bradburn (1969) reported that negative and positive affect are different concepts (i.e., they do not correlate highly with each other), it is not clear why negative affect scores were subtracted from positive affect scores. Furthermore, it would appear that Bradburn's scale more accurately reflects the concept of psychological well-being rather than the broader concept, quality of life. It seems that studies using Bradburn's scale as an indicator of quality of life are not fully measuring global quality of life.

In the health care literature, studies of quality of life have taken may approaches. On the whole, conceptualizations of quality of life used in health care research tend to differ from those in social sciences research. They tend to be simplistic and rarely specify relationships between variables. Several representative conceptualizations are briefly described.

Shaw (1977) mathematically conceptualized quality of life as $QL=NE \times (H+S)$, where QL represents quality of life, NE represents the patient's natural endowment (physical and intellectual), H represents contributions made to the individual by his home and family, and S represents contributions made on his behalf by society. Shaw did not elaborate on the implied interactive effect of his equation. Rather, his purpose was to emphasize that many factors are frequently not considered by physicians in their assessments of their patients' quality of life.

George and Bearon (1980) defined quality of life in terms of four underlying dimensions: life satisfaction, self-esteem, general health and functional status, and socioeconomic status (p. 6). The authors suggested indices that measure each of these dimensions. However, they did not attempt to describe the relationships between these concepts.

Burckhardt (1985) hypothesized a causal model explaining the impact of arthritis on quality of life. She based her model on a cognitive framework developed by Lazarus and Cohen (1976), and tested it using path analysis. Overall, the model explained 46% of the variance in quality of life. Age, sex, severity of pain, severity of impairment, socioeconomic status, and social network configuration were the environmental input variables in the model. Expected relationships between these variables were specified based on logical time sequencing and previous research findings. Perceived support, negative attitude toward the illness, self-esteem, and internal control over health were chosen as mediators in the model. Only the mediators directly contributed to a higher quality of life. Severity of arthritis-related impairment, an input variable, indirectly affected quality of life through the mediating variables.

Many other conceptualizations of quality of life can be found in the literature. However, most have not received extensive attention or testing. Needless to say, this problem has made measurement difficult, and little progress has been made toward the development of a theory of quality of life.

Developments towards a Theory of Quality of Life

From a review of the current literature on quality of life, it appears as though the approaches used to study the concept are largely atheoretical. For the most part, researchers do not provide a description of the theoretical basis for their studies. However, Diener (1984) stated that psychological, sociological, and biological theories have been used to study happiness. He suggested that, from a psychological perspective, the following types of theories have been used in the study of quality of life: telic or endpoint theories (i.e., happiness is gained when some state, such as a goal or need is attained, e.g., Maslow's hierarchy of needs); pleasure or pain theories (i.e., an individual's goals or needs relate to what is missing in that person's life. The assumption in this approach is the greater the deprivation, and hence the unhappiness, the greater the joy upon achieving the goal); activity theory (i.e., happiness is a byproduct of social activity, e.g., Aristotle); top down versus bottom up theories (i.e., some philosophers believe that happiness is the sum of many small pleasures. This is contrasted with the top-down approach which assumes that there is a global propensity to experience situations or things in a positive way); associonistic theories (i.e., which seek to explain why some individuals have a temperament or personality that predisposes them to happiness); and judgement theories (i.e., happiness results from a comparison between some standard and actual conditions). Zautra and Goodhart (1979) also suggested that four, somewhat different, theoretical perspectives have been used to study quality of life: epidemiological models (i.e., distribution of quality of life in the population and factors in people's lives that increase the probability of quality of life); life crisis theories (i.e., outcomes result from life experiences); competency theories (i.e., quality of life arises from experiences of self-mastery, efficacy, and competency); and adaptation-level theories (i.e., people evaluate their own experiences by comparing them against a baseline or standard called the "adaptation-level").

One could also relate quality of life to several social theories. From a Marxist perspective, one would examine the relationship of equitable social, political, and economic structures to happiness of the collective. Using a functionalist perspective, one would examine the functional and dysfunctional factors influencing quality of life (Wells, 1978). A phenomenological perspective would focus on the meaning of life situations to the individual. However, sociologists have recognized that current quality of life research (particularly in the social indicators research movement) lacks a sound theoretical basis (Bunge, 1975; Buttel, Wilkening, & Martinson, 1977). In order to develop a better understanding and assessment of quality of life, more theoretical and methodological work is required.

Despite the premise that the affect that characterizes the experience of quality of life is essentially inexpressible, it has been suggested that phenomenology can provide a theory of quality of life (Schuessler & Fisher, 1985). It has been argued that the experience of quality of life can only be described in terms of personal meaning to the individual. In Ziller's (1974) phenomenological theory, quality of life is inherent in self-appraisal, which in turn is inherent in the interactions of individuals with significant others. Self-regard, rather than happiness or satisfaction, is the key outcome.

Benner (1985) also proposed that a phenomenological approach be used to explain, predict, and understand quality of life of individuals with illnesses or diseases. She argued that quality of life should be approached from the perspective of "being", and that research strategies should uncover meaning and relational qualities. In her opinion, hermeneutics (i.e., the theory and method of interpreting meaningful human action through the interpretation of texts; see Abercrombie, Hill, and Turner, 1985) is a suitable strategy since it seeks to study the person in the situation rather than isolating the person and situational variables, as structural analyses tend to do. Although phenomenology could provide new theoretical perspectives for the further study of quality of life, no research of this type has as yet been reported in the literature. Furthermore, generalizations must be drawn with caution in this type of research since the meaning of a life experience of any individual is not necessarily the same as that of any other person.

Quality of Life of Patients with End Stage Renal Disease

In Canada, patients enter treatment programs for end stage renal disease at a rate of 57.6 per million of population annually (Schriel, et al., 1985). These treatment programs (i.e., hemodialysis - home or incenter, peritoneal dialysis, and transplantation) are successful in that they extend the lives of many people. However, the quality of life of dialysis patients is often questioned. Dialysis patients must not only undergo the rigors of regular dialysis treatment and a rigid dietary and medical regimen, but they are also prone to develop a number of related secondary complications. These include anemia, hypertension, bone disease, and sexual dysfunction. The stressors associated with the disease and its treatments have been well documented (Anger, 1975; Baldree, Murphy, & Powers, 1982; Dickerson, 1980; Gurklis & Menke, 1988; Harris, Hyman, & Wood, 1978; Hastings, 1978; Kravette, 1978). It is therefore important to examine the quality of life of these patients.

Levy and Wynbrandt (1975) attempted to evaluate the quality of life of incenter hemodialysis patients. After several interviews, the investigators (who were psychiatrists working with renal failure patients) rated each patient's quality of life as good, fair, or poor. In this small sample, only one third of the patients were rated as having a good quality of life. The patients' assessments of their quality of life were not considered. No attempts were made to validate the researchers' assessments. In another study, Jackle (1974) used Cantril's Self-Anchoring Striving Scale to determine the life satisfaction of 30 hemodialysis patients. In a ladder with steps ranging from zero to ten, the patients, on the average, placed themselves at 5.5. Subjects in a control group had a mean score of 6.6.

Murphy (1982) used a multivariate psychological approach to examine the adjustment and quality of life of 150 chronic hemodialysis patients from nine dialysis units. A series of instruments measuring stress, coping mechanisms, social functioning, depression, and adjustment were administered to the patients. Murphy found that patients reported that the most severe stressor was fluid restriction. She also found that problem-oriented coping was the coping mechanism most frequently used, depression was only minimally evident, and the patients were noncompliant to their fluid restrictions. While the study is methodologically sound, the measures used do not adequately reflect global quality of life. Furthermore, concern has been expressed regarding the use of psychological tests in physically ill or disabled persons (Bloom & Ross, 1982; Yanagida & Strelzer, 1979). Different response sets are possible in patients with physical illnesses. Specific norms would need to be developed for each patient population.

In many studies, attempts have been made to compare the quality of life of patient groups receiving different treatments. Johnson, McCauley, and Copely (1982) studied the quality of life of hemodialysis and transplant patients with an instrument developed by combining subscales from the works of Campbell et al. (1976), Bradburn (1969), and Holmes and Rahe (1967). Reliability and validity of this new measure were not described by the researchers.

Fifty-nine patients were studied. It was found that the renal transplant recipients, in comparison to other Americans, had a normal quality of life. Patients undergoing hemodialysis and awaiting their first renal transplant had a near normal quality of life. However, the hemodialysis patients in whom renal transplants had failed had a substantially lower quality of life.

However, findings contrary to those of the Johnson et al. study (1982) were found by Binik and Devins (1986-87) in two studies with sample sizes of 80 and 70 respectively. Using a large number of instruments, namely the McGill Pain Questionnaire, the Beck Depression Inventory, the Self-Esteem Inventory, the Internal-External Locus of Control Scale, the Health Locus of Control Scale, the Hamilton Psychiatric Rating Scale for Depression, the Profile of Mood States, the Affect Balance Scale, the Life Happiness Rating, and other self-reports of distress, perceived control, and intrusiveness, Binik and Devins found no significant differences among dialysis patients with a history of previous transplant failure, and patients with functioning transplants.

A modified "time trade-off" technique was used to estimate the global perceptions of quality of life of 42 hemodialysis patients, 17 peritoneal dialysis patients, and 14 transplant patients, with regard to the utility or worth of their health state (Churchill, Morgan, & Torrance, 1984). Scores could range from 0 for death to 1.0 for perfect health. Test-retest reliability and concurrent validity were demonstrated. The following mean utility state scores were obtained:

.57 for hemodialysis patients, .57 for continuous ambulatory hemodialysis patients, and .80 for renal transplant patients. Although a global picture of quality of life was obtained, no attempts were made to examine determinants of quality of life other than treatment modality.

Campbell (1981), a patient with renal failure, developed a conceptual model of quality of life based upon four constructs: general life satisfaction, self-esteem, family cohesion, and social isolation. He designed and used a self-report questionnaire comprised of four scales, one for each construct, in a study of 105 patients receiving a variety of treatment modalities for renal failure. Campbell found that greater independence with regard to the treatment regimen, higher socioeconomic status, and higher levels of social integration were associated with a higher perceived quality of life.

Bonney, Finkelstein, Lytton, Schiff, and Steele (1977) studied survival and quality of life of patients receiving treatment for renal failure. They used an interview approach, the National Kidney Foundation functional classification, and the Kupfer, Detre System for assessing psychological status. The data suggested that the hemodialysis patients have a significantly impaired quality of life. The patients tended to be unemployed, inactive physically, and moderately depressed. As well, they had symptoms of organic brain dysfunction, numerous physical complaints, and a decreased frequency of sexual intercourse. The renal transplant patients had overall higher levels of functioning.

Simmons, Anderson, and Kamstra (1984) also compared the quality of life of 458 patients on CAPD, in-center hemodialysis, and after transplantation. They used measures of physical well-being (an eight item symptom scale, frequency of hospitalization, difficulty with daily activities), emotional well-being (Campbell's Index of Well-Being, self-esteem scale, depression scale, independence scale, and control over destiny scale), and social well-being (vocational rehabilitation, satisfaction with major life roles, and absence of sexual problems). On almost all measures, transplant recipients appear to have the highest QOL. On many, but not all of the measures, CAPD patients had a higher QOL than incenter dialysis patients. They had fewer symptoms, less difficulty with activity, higher self-esteem, higher perceived health, and greater vocational rehabilitation.

Different findings were obtained by Kutner, Brogan, and Kutner (1986) in a longitudinal study of 97 patients with end-stage renal disease. They found that home hemodialysis patients rated their QOL higher than did transplant and CAPD patients. More transplant patients were employed, and on average, transplant patients reported a higher perceived health status. Patients who transferred from hemodialysis to transplantation reported higher QOL on almost every dimension. These changes persisted over time. No changes were found in patients who transferred from hemodialysis to CAPD, although assessments obtained from the home hemodialysis indicated that their QOL was not very different from that of the transplant group. These findings were explained by the possibility of within-modality changes; that is, a number of treatment changes of hemodialysis patients may have affected the physical status and psychological outlook of these patients.

In one of the most comprehensive studies to date, Evans and his colleagues (1985) studied the quality of life of 859 patients with renal failure. Both subjective and "objective" measures were used. The subjective measures included Campbell et al.'s (1976) indicators of life satisfaction, psychological affect, and well-being. "Objective" measures (which are not truly objective) included the Karnofsky Index (a physician-rated measure of functional impairment), and the self-reported ability to work. It was found that the patients with renal transplants had the highest quality of life, followed by patients on home hemodialysis. This difference persisted even when demographic variables (age, sex, race, education, and presence of other illnesses) were controlled statistically. Although the quality of life of the transplant recipients compared favorably with that of a general American population, the patients on dialysis did not work or function at the same level as people in the general population.

Correlates of Quality of Life

The identification of factors that influence quality of life is important for the development of new social and health care programs. Hence, social scientists and health care professionals are striving to uncover ways to improve the quality of life of people in society (McNeil, Stones, & Kozma, 1986b). In the following pages, the literature addressing the relationships between life situational variables (i.e., sex, age, race, education, income, community standard of living, employment, religiosity, personality, social support, marital status, health status, treatment modalities, and other factors) and quality of life (or related concepts such as life satisfaction, happiness, and subjective well-being) is summarized.

Sex

In a few studies, gender differences were noted on specific domains of life satisfaction such as health satisfaction, financial satisfaction, and satisfaction with standard of living (Markides & Martin, 1979; Medley, 1980; Michalos, 1982). However, most researchers have suggested that the sex of an individual has little impact on the quality of his/her life experience (e.g., Andrews & Withey, 1976; Goodstein, Zautra, & Goodhart, 1982; Larson, 1978; Olsen, 1980). Campbell, Converse, and Rodgers (1976), in their comprehensive study on the quality of American life, concluded that men and women "differ very little in their expressions of general well-being, their satisfactions with the specific domains of their lives, or their feelings of stress" (p. 433). Bradburn (1969) notes that women report greater negative affect; however, it seems that they also report greater joys (Braun, 1977; Cameron, 1975). Nevertheless, there is little difference between the sexes on global scales of happiness or satisfaction. The mechanism for this apparent contradiction has not been closely examined, but may relate to the lack of specificity in measurement and to the propensity to respond positively to broad questions. Two studies have reported an interaction of sex and age on quality of life; it appears that younger women are happier than younger men, but that older women are less happy than older men (Medley, 1980; Spreitzer & Snyder, 1974). Campbell et al. (1976) stated, "it is far less important to know that a person is a woman than to know she is a young childless wife or middle aged widow. . ." (p. 441).

Age

The effect of age on quality of life has been examined closely. In a study of patients with chronic renal disease, Kutner and Cardenas (1981) found that patients over 55 years of age were more likely to show evidence of clinical depression on the Zung depression scale. Similarly, Rozenbaum, Chaimovitz, and Bearman (1984) found that dialysis patients over 60 years of age had a lower quality of life than did younger patients. Despite the findings in some studies that young people are happier than old, other research has suggested that there are virtually no effects of age on quality of life (Andrews & Withey, 1976; Edwards & Klemmak, 1973; Spreitzer & Snyder, 1974), particularly when factors such as decreased health, decreased financial resources, widowhood, and loss of friends are controlled. However, the findings are often confusing. For instance, Campbell et al. (1976) reported that older persons were more satisfied than younger people in every domain except health. Positive correlations of age with domain satisfaction scores and scores on the Index of General Well-Being were found. However, the subjects' reports of happiness decreased with age. Campbell et al. (1976) explained these findings on the basis of the shorter, more transient nature of happiness. As well, they stated that "satisfaction statements rise because aspirations and expectations have been progressively hedged back to fit the realities of the situation" (p. 168). Despite the apparent contradiction with these findings, Stock, Okun, Haring, & Witter (1983) concluded, on the basis of a meta-analysis, that the correlation between age and subjective well-being was near zero, regardless of what other variables were controlled. Most existing research is cross-sectional, and therefore is likely to confound the effects of age and cohort (Northcott, 1982). Further studies using longitudinal designs should help clarify these relationships. Use of a scale or measure of quality of life that is unbiased with respect to age (and gender) (such as the one developed by Carp and Carp, 1983) may also help alleviate some of the concerns regarding measurement of quality of life in an elderly population.

Race

In the United States, blacks usually have reported a lower quality of life than whites (Andrews & Withey, 1976; Bradburn, 1969; see also Diener, 1984). However, the differences are not clear when statistical controls for variables such as age, income, or socioeconomic status are employed. For example, older blacks in the United States reported higher levels of happiness than did older whites (Campbell et al., 1976).

Education

Little research has examined the effects of education alone (apart from socioeconomic status) on subjective well-being or quality of life (McNeil, Stones, and Kozma, 1986a, 1986b). Davis (1981) reported that education had no effect on either satisfaction or happiness, although it is a good predictor of life feelings such as anomie. Edwards and Klemmak (1973) found a significant zero order correlation ($r=.24$) between education and subjective well-being, but this relationship became insignificant when other variables were controlled.

Income

Traditionally, income has been used as the primary economic indicator of quality of life. Numerous studies have demonstrated a positive relationship between income and quality of life (Andrews & Withey, 1976; Bradburn, 1969; Zautra, Beier & Cappel, 1977; see Diener, 1984; Larson, 1978 for reviews and numerous citations). Ackerman and Paolucci (1983), for instance, found a relationship between feelings of satisfaction and adequacy of income. Satisfaction with income and satifaction with levels of consumption were found to correlate with both objective and subjective measures of quality of life. Similar relationships have been demonstrated in a number of different countries. However, Campbell et al. (1976) described a downward trend in happiness from 1957, despite a period of tremendous economic growth in the United States. These data suggest that the influence of income is largely relative; that is, people who are wealthier tend to be happier, but as the overall level of income rises, happiness does not necessarily increase (Diener, 1984).

Community Standard of Living

Many of the existing "quality of life" studies address the standard of living of specific communities, cultures, and groups. As noted above, it is interesting that people in wealthier countries do not necessarily have a higher perceived quality of life than people in less developed countries. Contrary to common expectations, there is some evidence that persons living in less economically developed communities are at least as satisfied and possibly more satisfied than persons living elsewhere (e.g., Amos, Hitt & Warner, 1982; Wilkening & McGranahan, 1978). For instance, Indians are about as happy as Japanese, and Latin Americans are happier in some respects than Europeans (Diener, 1984). These findings have been explained by the hypothesis that residents of less developed communities aspire to less (Schuessler & Fisher, 1985). However, it is possible that other significant variables (e.g., satisfaction with family life and friendships) are more important predictors than community standard of living. In such instances, it is important to use subjective measures or indicators in addition to objective and economic indicators of quality of life.

Employment

Campbell, et al. (1976) and Bradburn (1969) found that people who were unemployed reported a lower quality of life than people who were employed, even when differences in income were controlled. This suggests that employment status has an impact on quality of life (perhaps through self-esteem or other personality characteristics) apart from that of income. A number of major studies have demonstrated a slight positive association between employment and well-being in populations of elderly persons. However, the degree of association decreased (to a partial r of .08 to .09) when health, physical disability, age, and income were controlled (see Larson, 1978). In longitudinal studies on the effects of retirement, George and Maddox (1977) and Palmore, Fillenbaum, and George (1984) found that mean levels of subjective well-being did not differ significantly from before retirement to after retirement.

It also appears that job satisfaction may be a major predictor of quality of life (see Diener, 1984). For the majority of adults, work occupies a considerable proportion of time during waking hours. Zautra, et al. (1977) suggested that quality of work life is second in importance only to family life. Similarly, Campbell et al. (1976) found satisfaction with work to be a major predictor of global quality of life.

Religiosity

Moberg and Brusek (1978) deplored the lack of research dealing with the spiritual aspects of life. To date, very few studies have examined the relationship between religiosity and quality of life. Hadaway and Roof (1978) found that faith was the strongest (of the variables considered) predictor of quality of life. In this study, quality of life was measured only by a single item question asking about the "worthwhileness" of life. In other studies where religious faith, importance of religion, religious traditionalism, or church attendance and participation were independent variables and quality of life (and/or well-being) was the dependent variable, positive relationships were found (Cantril, 1965; Edwards & Klemmak, 1973; see also Diener, 1984; Moberg & Brusek, 1978).

Personality

Several kinds of personality measures have been used as predictors of quality of life. Self-esteem has been found to be a strong predictor (Campbell, et al., 1976; see also Diener, 1984 and McNeil, et al., 1986b). Burckhardt (1985) found that self-esteem accounted for 25% of the explained variance of quality of life in a sample of 94 patients with arthritis. She found that the greater the severity of impairment in the patients, the lower the self-esteem. However, Wolk and Telleen (1976), in a study of elderly people in a retirement home, found that their measure of self-esteem accounted for only 1.64% of the variance in life satisfaction.

Martinson, Wilkening, and McGranahan (1984) found that feelings of alienation were important predictors of overall satisfaction in 1423 rural Wisconsonites. The dimension of powerlessness appeared to be more important as a predictor of life satisfaction in young adults; it receded in importance in older persons, whose lives had presumably stabilized.

In studies examining the relationships of other personality variables (i.e., locus of control, intelligence, extraversion, and neuroticism) with quality of life, conflicting results have been found. However, since the measures used differ, and few controls were used, no conclusions can be drawn regarding the effects of these personality variables (see Diener, 1984; McNeil, et al., 1986b).

Social Support

Zautra (1983) noted that people frequently have their social ties to others in mind when they think about quality of life. Happiness seems to be dependent upon the availability and quality of relationships with other people (Waltz, 1986). In his work on suicide, Durkheim noted the protective influence of the social environment on mental health. Considerable research has demonstrated the relationship of social support to both physical and mental well-being (see Badura & Waltz, 1984; House, 1986; Mitchell & Trickett, 1980; Thoits, 1982). Waltz (1986), as part of a longitudinal study on adaptation of cardiac patients, found that social support appeared to buffer negative affect (as measured by the Bradburn Affect Balance Scale). Burckhardt (1985) reported that perceived support contributed 10% of the explained variance in quality of life in patients with arthritis. Similarly, Wilkening and McGranahan (1978) examined the relative contributions of a number of variables to feelings of satisfaction. They found that changes in interpersonal relations contributed more heavily to the variance of their satisfaction measure than did either socioeconomic status or social participation. Although there is some controversy regarding the mechanisms underlying these findings (Thoits, 1982), there is considerable support for the buffering hypothesis (i.e., the stress buffering effect of social support) (Gore, 1978; Kaplan, Cassel, & Gore, 1977; Mitchell & Trickett, 1980; Tilden, 1985; Wheaton, 1985).

Marital Status

There is less agreement regarding the impact of marital status on quality of life. In Ward's (1979) analysis of General Social Survey Data, elderly respondents who had never married were considerably less happy than those who were married. Similarly, Beckman and Houser's (1982) data revealed that "widows evidenced poorer general well-being than did married women; widows also scored lower on four of five individual dimensions of well-being" (p. 247). In studies where socioeconomic status and other variables were controlled, only a slight positive association was sustained (Edwards & Klemmak, 1973; Spreitzer & Snyder, 1974). Campbell et al. (1976) found that marriage contributes to overall happiness and specifically to satisfaction with marital status. However, having very young or teenage children, had a stronger offsetting effect, particularly among those people who were less than completely satisfied with their spouse. In contrast, Edwards and Klemmak (1973) found that marital status (and family size) had no significant impact on life satisfaction.

Perceived Needs

Schuessler and Fisher (1985) suggested that future quality of life studies should include the perception of needs as a control variable. They cited several studies in which quality of life changes significantly after adjustments were made for differences in perceived needs. For instance, Rodgers (1977) found that women who expected to continue working when money was no longer needed demonstrated greater life satisfaction than women who expected to stop working at that time.

Quality of Life Over Time

Several studies have used quality of life as a predictor of itself at a later time. Using the Cantril Ladder, Palmore and Kivett (1977) found that the measure correlated with itself over time (r=.4 to .56 for periods of up to four years apart). Similarly, Campbell, et al. (1976) found a correlation of .53 over an eight month period on the retest of the Index of Well-Being. Using the Memorial University of Newfoundland Scale of Happiness (MUNSH), McNeil, Stones and Kozma (1986b) found that a large sample of elderly subjects, mean levels of subjective domain indicators of happiness did not change over an 18 month period. However, scores on objective indicators did change during the same time period.

Health Status

Health is considered to be an important aspect of quality of life. In studies by Campbell et al. (1976) and Harwood (1976), it was found that health was the most important of the listed domains to the subjects under study. Similarly, Flanagan (1982) found that health was regarded as important or very important by 95 to 98% of the 3000 subjects (representing both sexes and all age groups). This percentage was higher than that of any other possible domain.

Furthermore, other studies have demonstrated a positive link between health and perceived quality of life (Johnson, Cloyd & Wer, 1982; Palmore & Luikart, 1972). In a convenience sample of 42 hemodialysis patients, Stegman, Duncan, Pohren, and Sandstrom (1985) found that patients who were able to perform more challenging physical activities were most satisfied with their present life and had optimistic future expectations. In this study, the most significant predictor of quality of life was the ADAPT physical ability score (see Daugton, Fix, Kass, Bell & Patel, 1982). Larson (1978), in a comprehensive review of the literature on the subjective well-being of older Americans, reported that there was a significant relationship between indicators of health and reported quality of life in all studies in which the variable was examined. Correlation coefficients ranged between $r=.2$ to .5. This association remained strong, even when other variables such as socioeconomic status and employment were controlled or considered simultaneously (Edwards & Klemmak, 1973; Spreitzer & Snyder, 1974).

As might be expected, people with a lowered health status have deficits in their quality of life. People who are sick or physically disabled are less likely to express positive feelings about their lives. Baker and DeMaeyer (1979) argued that even minor disorders, such as mild anemia, are probably associated with decreases in quality of life. Similarly, Badura and Waltz (1984) concluded that, on the average, healthy individuals have higher levels of psychological well-being than those living with a chronic illness.

Treatment Modality

Much of the quality of life research published in health care journals addresses the effects of various treatment modalities. For example, patients with chronic lung disease (Daughton, Fix, Kass, Bell & Patel, 1982; McSweeny, Grant, Heaton, Adams & Timms, 1982), chronic mental disorders (Lehman, Ward & Linn, 1982), renal failure (Churchill, Morgan & Torrance, 1984; Evans, et al., 1985; Levy & Wynbrandt, 1975), heart disease (Penckoffer & Holm, 1984), cancer (Hallgren, Paterson & Arcand, 1983; Spitzer, et al., 1981), arthritis (Burkhardt, 1985; Earle, et al., 1979), and hypertension (Croog, et al., 1986) have been the subjects of considerable study. In patients with end stage renal disease, quality of life with a renal transplant has been compared with that of hemodialysis and peritoneal dialysis (e.g., Bonney, Finkelstein, Lytton, Schiff, & Steel, 1978; Churchill, Morgan & Torrance, 1984; Evans, Manninen, Maier, et al., 1985; Johnson, McCauley, & Copely, 1982; Kaplan DeNour & Shanan, 1980). As might be expected, the quality of life of transplanted patients is higher than that of their dialyzed counterparts. However, very few studies have simultaneously examined or controlled for the effects of other important variables such as social support, health status, age, or socioeconomic status. Yet, there is some evidence that significant differences in case mix exist between the groups, and that of other variables (e.g., age) should be considered in any prediction or model of quality of life of these patients (Kutner & Cardenas, 1981; Rozenbaum, Chaimovitz, & Bearman, 1984).

Perceptions of Health and Illness

The provision of quality health care depends, to a great extent, upon the accuracy of health care providers' perceptions of patients' physical and psychological states (such as quality of life). Health care professionals commonly assume that their perceptions and assessments of the patients' health status are accurate, and are congruent with the perceptions of the patient and those of other health care providers. However, it is suggested in some of the literature that discrepancies exist between the perceptions of patients and care providers, and between various groups of care providers. These discrepancies can have serious consequences. A lack of perceptual congruency between patients, nurses, and physicians could result in limited communication (Skipper, Tagliacozzo & Mauksch, 1964), an impairment of the patient-practitioner relationship, poor compliance with prescribed regimens (Christensen, 1978), and unnecessary or inappropriate treatment (Bradley, Brewin & Duncan, 1983).

Perceptions have been defined as the outcomes of cognitive processes used to obtain, organize, and utilize information about stimuli (King, 1962). They are affected by both objective and subjective factors. The subjective components of perceptions include such attitudinal factors as preconceptions, sterotypes, and evaluations. Attitudes influence the way in which people perceive and respond to the world (Allport, 1955). An attitude is "the predisposition to respond to a particular object in a generally favorable or unfavorable way" (Michener, DeLamater & Schwartz, 1986). Hence, perceptions are both sensory and cognitive phenomena that are influenced by an individual's attitudes and beliefs about what is important to him/her.

Literature Supporting Congruence of Perceptions

Physicians and nurses generally believe that patients will concur with their assessments after they have discussed the condition and treatment with them (Maughton, 1982). In fact, it has been suggested that health care professionals have not performed their roles satisfactorily should patients not concur with them (King, 1962). This perspective assumes that effective communication has taken place.

Hill (1978), in her study using both emic (where phenomenal distinctions are derived from and regarded as appropriate by the subjects/actors themselves) and etic perspectives (where phenomenal distinctions are judged appropriate by the scientific community; generally considered the "world view"; see Harris, 1968) found that dialysis patients' perceptions regarding their rehabilitation status were congruent with those of staff members. This finding was contrasted with results obtained in a physical rehabilitation unit, where patients and staff members communicated poorly with each other. Hill reported that the dialysis patients were encouraged to accept responsibility for their illness. She suggested that the congruence of perceptions between personnel and patients in the dialysis unit could be described by Freidson's (1970) model of a "therapeutic pattern" of health care. This pattern is characterized by a complex system of monitoring and treating clients, where the client must be persuaded to become an active participant in the therapy. Since there are general trends towards consumerism in health care, increased patient education, and familiarity of the general public with bureaucracies (Cockerham, 1986; Reeder, 1972), one could assume that the greater availability of information would facilitate the convergence of perceptions of patients and health care providers. Reeder (1972) claimed that the increasing development of large bureaucracies ensures that members of society have similar experiences and attitudes, thereby familiarizing people with the bureaucratic aspects of modern medicine. As well, Reeder states that a new provider-consumer relationship has emerged between physicians and patients. Dependency upon the physician has been reduced, placing the consumer on a "more equal" basis with the physician, particularly with patients who are young, well-educated, and have middle and upper class social backgrounds (Cockerham, 1986, p. 179). This pattern appeared to be evident in the dialysis unit described by Hill (1978).

Furthermore, as members of society become better educated, any differences in perceptions of patients and health care providers may converge and disappear. In several studies cited by King (1962, p. 153), younger and better educated individuals showed more humanitarian and scientific attitudes toward the mentally ill. These attitudes tend to be congruent with those of health care professionals.

Many researchers also assume that patients' perceptions relating to health and/or illness states are congruent with those of health care providers. In research studies, it is common to find that patients' reports are validated by physicians (e.g., Churchill, Morgan, & Torrance, 1984). Torrance justifies his use of patients' (as opposed to health professionals') reports of health state utilities by stating, "Most investigations have found no difference among different groups - age, sex, socioeconomc status, ethnic background, religious affiliation, general public, physicians, nurses, patients; a few have found small differences" (1986, p. 16). For instance, Wolfson, Sinclair, Bombardier, and McGeer (1982) in their study of measurement of preference of health states as an indicator of functional status of stroke patients found no significant differences in the preferences expressed by the groups of respondents (i.e., patients, families, therapists, and medical specialists). Other variables, such as age, sex, income, medical knowledge, and disability experience did not appear to have any significant effect on health state preferences.

Also, Patrick, Bush, and Chen (1973) failed to find significant differences in ratings of health leaders (including physicians), public health students, and the general public on the value of health states. Gilson, Gilson, Bergner, and their colleagues (1975), similarly found no significant differences in scores obtained or the

Sickness Impact Profiles between judges with and without health care backgrounds. However, these studies were based on hypothetical examples, with scores determined by subjects who did not necessarily have any experience with the health/illness state under consideration. Such experience may have a significant effect on perceptions (Rosser & Kind, 1978; Sackett & Torrance, 1978).

Literature Supporting Discrepant Perceptions of Patients and Care Providers

In contrast to the common assumptions that health/illness beliefs of patients and health care providers are congruent, many studies provide evidence for the position that significant discrepancies exist. These studies are presented with respect to aspects of illness (i.e., pain, psychosocial needs, treatment, quality of life) and health care (educational needs, quality of care). In some of the studies, perceptions of health or illness are addressed while in others the perceived importance of aspects of health or illness are discussed. These are, of course, different phenomena and it cannot be assumed that perceptions of importance regarding some aspect of health or illness are necessarily related to the actual perceptions regarding that aspect of health or illness.

Perceptions of Pain

Pain perception is considered to be a very complex phenomenon (Donovan, 1982). It is recognized that the pain experienced by a patient is very subjective (Bourbonnais, 1981). However, the recognition of pain by nurse and physicians is necessary for the appropriate administration of analgesic medications (Bourbonnais, 1981; Marks & Sachar, 1973).

Johnson (1976) found that nurses on gynecology wards consistently underestimated the duration and intensity of pain of their patients. Similarly, Bradley, Brewing, and Duncan (1983) found that midwives rated patients' perceptions of labor as significantly less unpleasant than the patients themselves did. In fact, with women of higher parity, there was actually a significant negative correlation; the more unpleasant the women found their experience to be, the more likely it was for the midwives to rate the experience as pleasant (r=-0.31).

Walkenstein (1982) studied the relationship between burned patients' perceptions of pain and nurses' perceptions of patients' pain, using the Stewart Pain-Color Scale. Using data from 45 pairs of scores, she found a positive correlation (r=.44) between the nurses' perceptions of the burned patients' pain and the patients' perceptions. Despite the fact that she concluded that there was a relationship between their perceptions, and that "nurses in the burn unit were realistic in their assessment of patients' pain in general" (1982, p. 235), it is disconcerting to note that there was a statistically significant difference between the groups and that only 19.3% of the variance was accounted for by the nurses' perceptions. In a further analysis of perceptions of pain during treatments (e.g., physiotherapy, debridement, hydrotherapy), there was no relationship between nurses' and patients' perceptions (Walkenstein, 1982, p. 235).

In contrast, Nehemkis, Gerber and Charter (1984) found that physicians, and to a lesser extent nurses, overrated the importance of pain in a group of 26 cancer patients. In this study, it may be the diagnostic category (i.e. cancer) that affected the caregivers' perceptions of pain. This hypothesis is consistent with the findings of Davitz and Pendleton (1969) who demonstrated differences in inferences of suffering as a function of patient diagnosis. Using a reliable scale composed of 24 brief vignettes and a Likert-type scale, they found that nurses inferred more suffering to patients with burns and leukemia, and less to patients with diabetes.

Perceptions of Psychosocial Needs

Although nurses have placed greater emphasis on the provision of psychosocial care to patients in recent years, there is evidence that caregivers frequently misperceive the feelings and psychosocial needs of patients. Jennings and Muhlenkamp (1981) used the Multiple Adjective Affect Check List, which measures levels of anxiety, hostility, and depression, and which has established construct validity, to demonstrate that caregivers' perceptions of these affective states were considerably higher than the patients' self-reports. The authors attempted to explain these findings in light of Wright's (1960) mourning hypothesis, a theoretical formulation that states that caregivers need to see clients as feeling negatively in order to reassure themselves that their value systems, emphasizing health, are intact.

Similarly, Carr and Powers (1986) found that nurses working on a cardiothoracic unit generally rated all items on a five point Likert-type Stressor Scale (designed by the investigators) as significantly more stressful for coronary bypass patients than the patients themselves did. In Johnson's (1976) study on gynecology wards, the worries of patients were also overestimated by nurses. In a subsequent study, Johnson (1982) compared the perceptions of surgical patients, their nurses, and colleague-patients using the Hospital Adjustment Inventory. She found that other patients recognized patients' worries more accurately than did nurses, who again tended to overestimate the number of worries.

Muhlenkamp and Joyner (1986) found, in their study of 30 arthritis patients and their nurses, that the nurses were generally accurate in their assessments of the patients' affective states, as measured on the Multiple Affect Adjective Checklist. Although they did not find significant differences between means of the groups, it was found that the nurses did overestimate the level of anxiety and depression and underestimated the level of hostility of the patients. Correlations between patients' and nurses' ratings were not calculated. It is possible that, although mean scores do not differ significantly, that the relationships between nurses' and patients' scores are low. It was found that nurses' education was associated with low discrepancy scores; that is, the higher the nursing education that the nurse had received, the more accurately she perceived the emotional state of the patient.

Perceptions Regarding Treatment

Some studies have shown that perceptions regarding treatments differ between patients and health care providers. Bradley, Brewin and Duncan (1983) found that patients and midwives disagreed about the patients' use of techniques for controlling discomfort (i.e., breathing, relaxation, psychoprophylaxis). Patients reported that they used such techniques frequently while midwives believed that their use was less frequent.

Perceptions Regarding Quality of Life

Some findings indicate that there is also a disparity between patient and staff perceptions of life experiences and quality of life associated with certain chronic illnesses. Gerber (1980) conducted a study comparing perceptions of dialysis nurses and patients on nine dimensions, including dietary restrictions, financial burdens, and alterations in sexual functioning. The nurses overemphasized the relative importance of changes in family relationships and sexual activity, while underestimating the patients' concerns regarding dietary restrictions, travel limitations, and inability to complete household activities.

In a number of studies, the perceptions of care providers and patients regarding the importance of various aspects of quality of life have been addressed. For instance, in a study of 128 males with spinal cord injuries, nurses and patients were asked to rank the importance of various functional losses to the patients (Hanson & Franklin, 1976). Staff members viewed the loss of sexual function as substantially more important than the patients themselves did. The patients ranked the normal functioning of legs significantly higher than did the staff. In a study of 26 male patients undergoing treatment for advanced cancer, Nehemkis, Gerber and Charter (1984) compared the patients' rankings on 14 dimensions of quality of life (e.g. sexual activity, leisure activities, social relationships, pain) with the rankings of five oncologists, ten nurses, and four allied health professionals. Again, the staff undervalued the importance of changes in simple daily activities and leisure activities. The staff also thought that the changes in physical appearance would be of greater concern to the patients than they actually were. In this study, neither physicians nor nurses overestimated the concerns of patients regarding reduced sexual activity.

Similarly, Presant (1984, p. 573) concluded, on the basis of his findings that "physicians were relatively incapable of adequately describing patient quality of life". Correlations between patients' and physicians' scores on the Karnofsky scale and an overall quality of life score were only .37 and .27 respectively. On the subscores for psychological well-being, the correlations between patients' and physicians' scores were only .16 and .14.

Perceptions of Educational Needs

The provision of patient education is considered to be an important aspect of care provided by nurses and other health care professionals. The failure of patient education to achieve the desired behavioral and attitudinal changes has been attributed to inadequate or inappropriate communication between the patient and the care provider (Dodge, 1969). Goddard and Powers (1982) believe that patient education is successful in changing behaviors only when the issues of greatest concern to the patients are addressed. In their study of nine nurses and 24 hemodialysis patients, they found that the patients rated their informational needs, on a Likert scale, very differently than did the nurses. The patients assigned highest priority to the safety of their fistulae, while nurses thought information on blood pressure and diet control was more important for patients to know. Overall, nurses rated the informational needs of the hemodialysis patients higher than the patients themselves did. Although these differences in perceptions did not appear to interfere with nurse-patient relationships, as measured on a 14 item communication scale, the researchers suggested that nurses need to become more aware of patients' perceptions of their needs.

In a similar study, Lauer, Murphy, and Powers (1982) used an interview guide and a Likert-type scale (composed of 36 content-validated informational items) to assess the educational needs of cancer patients. Although both nurses and patients placed high value on patients' knowledge about their disease and treatment, nurses rated these items as significantly more important than did the patients. Again, nurses did not perceive the same priorities for patient learning. Nurses believed that "dealing with feelings" was the most important for them to know about their diagnoses, plan of care, how to care for themselves at home and work, and what their experiences would be during diagnostic procedures. These findings are supported by those of Dodge (1969) who found that long-term care patients are most interested in learning about their care, and that patients assign greatest importance to information they perceive as necessary for physical and psychological survival.

Tilley, Gregor, and Thiessen (1987) described a lack of congruence in the perceptions of 38 matched nurse-patient dyads. Using instruments designed for the study, they found that patients preferred to have a physician teach them information related to their condition. Nurses most frequently chose a nurse as the current and desired patient teacher. As well, it was found that patients and nurses had different desires related to patient education.

Perceptions of Quality of Care

Health care providers and hospital administrators are required to monitor the quality of care provided to patients in order to maintain hospital accreditation. Hence, measurement of patient satisfaction with care has become a common practice. Scammon and Kennard (1983) compared the perceptions of patients, physicians, and administrators regarding satisfaction with care providers. They found that all three groups had different perspectives regarding satisfaction with care. Pettit and White (1986) attempted to identify differences in perceptions of quality of care between patients, physicians, nurses, and hospital administrators. They developed an instrument to assess interpersonal relationships, need fulfillment, and patient education. The instrument had an internal consistency reliability score (alpha) of .84 or higher on each of the three dimensions. One hundred medical/surgical patients, 100 nurses, 100 physicians, and 97 administrators from the same large metropolitan hospital were selected as subjects for the study. Again, significant differences were found between the groups. The physician group valued patient education significantly less than did the other three groups. The patient groups rated basic needs as higher in importance than did the three groups of health professionals. No differences were found between groups on the "interpersonal needs" dimension.

Inherent Limitations on Maximal Expected Congruence

Despite expectations that perceptions of health care workers and patients are congruent, complete agreement is not likely to occur. A number of factors inherent in the nature of perceptions reduce the likelihood of congruence of perceptions between groups. Perceptions may fluctuate from week to week, day to day, and even minute to minute. For example, a patient may report that he/she is feeling "better" today, but that he was feeling "not too good" last week. Patients' perceptions of pain fluctuate even more frequently than do perceptions of health status (potentially on a minute to minute or second to second basis). It may be difficult for the health care provider to observe these changes in health states on the basis of objective criteria. Subjective patients' reports are also subject to interpretation and error. Not only is one limited by an inability to read the thoughts of others, but one must also recognize that perceptual congruence is limited by the accuracy of verbal and non-verbal communication. This problem is compounded in research projects, where some degree of measurement error is unavoidable. Hence, it is not realistic to expect that perceptions of health care providers are always or precisely congruent with the perceptions of patients.

Many psychoanalysts and phenomenologists would argue that every perception is "contextual and hence a product of the participation and mutual interaction of perceiver and perceived" (Auerhahn & Moskowitz, 1982, p. 30). Even in psychoanalysis, "appropriate and objective responses to the analysand's misperceptions of the actualities form part and parcel of every successful analysis" (Gedo, 1979, p. 24). Hence, it may be unrealistic to expect that perceptions of caregivers and patients be or should be congruent. Despite the validity of claims that all things are subjective and relative, there is recognition of the fact that misperceptions do exist and are problematic. Existing reports of research studies do not address this question.

Factors Affecting Perceptions

In existing studies, little emphasis has been placed on explaining the differences in perceptions. Only rarely have findings been linked to any theoretical framework, and few attempts have been made to identify factors that contribute to the discrepancies. Several possible variables that may contribute to differences in perceptions are discussed in the following paragraphs.

Cultural Background

Factors such as race, ethnicity, and nationality indicate cultural orientation and are considered to be important determinants of perceptions. Patients come from a variety of cultural and subcultural backgounds, which may differ form the backgounds of health care professionals. Consequently, patients may have different perceptions of the disease process and the manner in which the disease should be treated. For instance, many cultural transitions, such as food preferences, styles of emotional expression, and decision-making processes, should be considered in the treatment situation (King, 1962; Spector, 1979).

The cultural background of nurses has been shown to influence nurses' perceptions about a patient's pain and suffering. Davitz and Pendleton (1969) studied 130 nurses from five ethnic groups (32 Korean nurses, 30 Thailand nurses, 23 Puerto Rican nurses, 20 American black nurses, and 25 American white nurses). Striking differences in inferences were found among the American white, American black, and Puerto Rican groups; the Puerto Rican nurse had the highest scores (i.e., they inferred the greatest amount of suffering to the patients portrayed in the vignettes) while the American black nurses' scores were the lowest. In Hill's (1978) study, 70% of patients on rehabilitation units reported a problem in communication with medical staff because of differences in race. In addition, a majority of the white patients indicated that they resented black nurses. Similarly, Lauer, Murphy and Powers (1982) found that perceptions of black patients regarding their educational needs differed from the perceptions of the white patients. Black patients attributed less importance to the treatment items (i.e., purpose of medication, side effects, actions of chemotherapy) and general informational items (i.e., diagnosis, procedures, symptoms, how to care for self) than did the white patients.

Although many researchers have made no attempts to explain discrepant perceptions of patients and caregivers, it was noted that differences in sociocultural backgrounds of patients and caregivers are frequently described (e.g., Herron, 1985). As in Hill's (1978) study, it is not uncommon to find that patients were blacks and caregivers were predominantly white.

Ethnic minorities are known to hold beliefs that differ from those of Western health professionals about the etiology and treatment of illness, about the role of religion and the supernatural in illness and its treatment, about the role of therapist and the family in treatment, and about the process and context of treatment (Flaskerud, 1984). In a study of 68 mental health professionals and 227 subjects from six American minority groups, Flaskerud (1984) used a reliable and content valid instrument to demonstrate that there were signficant differences in perceptions between minority groups and mental health professionals, both in the labels placed on the problematic behaviors and in the suggested management of the behaviors. Using a stepwise regression, minority group status was the strongest predictor of response, explaining 69% of the variance.

The remaining variables (age, sex, education, occupation, religiosity, marital status, and family income) explained only an additional six percent of the variation.

Gender

It has been suggested that the gender of the care provider may affect patients' perceptions regarding their health care. In Hill's (1978) study regarding differential perceptions of the rehabilitation process, a majority of rehabilitation patients felt that they could not relate to a female physician, and were embarrassed to ask her about their condition. As well, the patients generally believed that female doctors were less competent than their male counterparts. Since the majority of nurses are female and the majority of physicians are still male, it will be important to examine the effects of gender on differences in perceptions.

Age

Age is also a variable that has been associated with perceptions of health and illness. King (1962, p. 153) described several studies that show that younger and better educated individuals are more likely to show a humanitarian and scientific attitude toward the mentally ill. With regard to perceptions of pain, Davitz and Pendleton (1969) and Mason (1981) found that nurses inferred the greatest amount of pain to young people (particularly children). However, age of the nurse and possible interactions between the age of the nurse and the age of the patient were not considered in the analysis.

Socioeconomic Status

The effect of social class or socioeconomic status on perceptions tends to be minimized in North American societies (King, 1962). However, perceptions are known to vary between social classes. Stereotypes of persons in various social classes persist, and interactions between individuals of different class groups can be affected. Because of the occupational prestige accorded to physicians in our society, physicians occupy a relatively high (upper middle and upper class) social status. King (1962) stated: "The greater the social distance between doctor and patient, the more difficult it is to establish mutual trust, respect and cooperation, and the more likely it is that the two people will not perceive each other in terms of the ideal roles of doctor and patient, but in terms of their social class status in the larger society" (p. 219).

The relationship between the perceptions of the physician and the nurse or the physician and other health care workers can be affected by the difference in the social status of the two positions. Physicians may expect deference because of their status. The nurse may feel frustrated and demeaned, and may be unable to objectively perceive the working situation (King, 1962, p. 299). Communication problems may result, thereby affecting the patient care.

Educational level is an important dimension of socioeconomic status. With respect to perceptions of health or illness, education has been associated with perceptions about mental illness; better educated subjects tend to have more positive attitudes (study cited in King, 1962, p. 153). However, further analysis of the data revealed that the effect of education was enhanced when the variables, interest and experience, were also present.

Experience

Jennings and Muhlenkamp (1981) suggested that increased experience of oncology caregivers influenced perceptions of affective states of the patients. However, contrary to their expectations, they found that with increased experience, the caregivers believed that the patients were more depressed than they actually were.

In a cross-sectional study of nurses' perceptions of pain experienced by their patients, Mason (1981) found that there was a trend for mean scores to reach a low point with regard to sensitivity to patient suffering after 6 to 10 years of experience. She suggested that nurses become desensitized to physical suffering after repeated exposure to it. However, the number of years of nursing experience was not related to inferences of psychological suffering. In another study, Walkenstein (1982) found no statistically significant relationships between nurses' perceptions of burn patients' pain and length of time the nurse was registered or length of time the nurse had worked in a burn unit.

In Lauer, Murphy, and Powers' (1982) study, the nurses' length of work experience did not correlate with their perceptions of importance of various types of educational items. However, this may be a result of the small sample size and the limited range of years of experience represented in the sample.

Role

It appears from the literature discussed thus far, that the specific roles that people hold may be major determinants of perceptions. The nature of the differences in perceptions can be interpreted in terms of role requirements, expectancies, and patterns of responses that the variables impose. For instance, physicians' perceptions can be linked to the occupational role that they have selected.

The most common proposition in role theory is that roles are associated with social positions (or statuses). A social position refers to an identity that designates a commonly recognized set of persons (Biddle, 1979). Generally, the social position of the physician differs from that of the nurse and that of the patient. Furthermore, role theory purports that "roles are induced through the sharing of expectations for role behavior" (Biddle, 1979, p. 5). For example, physicians are encouraged to engage in appropriate behaviors, such as wearing white lab coats in the hospital, because both they (themselves) and others (nurses, patients, instructors) have learned expectations of people in the sick role. Socialization processes are involved in developing all these expectations.

Although role theory has not been used extensively to explain discrepancies in health/illness perceptions, it appears from the studies described earlier that distinct differences exist in perceptions of groups of people playing different roles. Furthermore, it has been demonstrated that variables that effect or are dimensions of social position (i.e., socioeconomic status, education, sex, race) are related to health/illness perceptions. It is therefore important to incorporate the concepts of status and role in any future studies attempting to explain discrepancies in perceptions.

Limitations in Existing Research

Although the studies discussed thus far strongly suggest that discrepancies in perceptions between patients and health care providers are common, several methodological problems lead to uncertainty regarding generalization of the findings from these various studies. Very few of the researchers provided evidence that the instruments used were reliable and valid. Many of the instruments had been developed specifically for the study and had received little, if any, testing. This limitation makes it difficult to interpret and generalize the findings. Furthermore, in most studies in this area, small sample sizes have been employed, precluding the use of certain statistical techniques and examination of subgroups of data.

Very few researchers separated the data pertaining to the perceptions of the various categories of caregivers. For example, in the study by Nehemkis, et al. (1984), a table illustrated that significant differences existed between the perceptions of doctors and nurses. However, these differences were not discussed in the report. More studies are needed to identify the specific dimensions of health or illness perceptions about which health care providers do not agree. The nature and magnitude of these differences should be addressed using reliable and valid methods. As well, studies that explore the specific relationships between various social factors and congruence of health/illness perceptions are required. The relative effect of individual differences in perceptions as opposed to group differences needs to be examined. In order to understand and explain the nature of discrepancies in perceptions, these areas require further study.

Further research is also needed to assess the effects of discrepancies in perceptions. Discrepancies in perceptions among patients and various categories of health care providers could result in poor communication, poor patient compliance, and ethical dilemmas. Although it is assumed that discrepancies are detrimental to the care and well-being of the patient, little research has systematically addressed this hypothesis.

Summary

The lives of patients with end stage renal disease are affected by numerous stressors and restrictions. It has been suggested in many research studies that the quality of life of these patients is significantly impaired. Health care providers are frequently required to assess the quality of life of their patients, and to make decisions based on their assessments. However, some literature suggests that the perceptions of patients and health care providers regarding quality of life (and other illness-related variables) differ. Unfortunately, in existing research, there are many deficiencies, particularly relating to conceptualization and measurement of the concept, small sample sizes, and the lack of theoretical and/or explanatory efforts.

III. METHODOLOGY

Introduction

The purpose of this study was to explain the perceptions of physicians, nurses and patients regarding the QOL of patients with ESRD. A cross-sectional survey design was used to collect data from patients with ESRD and their physicians and nurses. In this chapter, the sample, setting, data collection procedures, instruments, hypotheses, operational definitions, ethical considerations and data analysis are discussed.

Sample

The sample consisted of patients with ESRD and the nurses and physicians who were responsible for the care of these patients. Since it was virtually impossible to obtain a representative sample of patients, convenience sampling techniques were used. Patients receiving treatment for ESRD (in the form of hemodialysis, CAPD, or renal transplantation) in northern Alberta were asked to participate in the study. A total population of approximately 400 patients was available. All patients who could read English, had been receiving treatment (i.e., had been on dialysis or transplanted) for more than one month, were over 18 years of age, and were mentally competent (in the judgement of the primary nurse or physician) were eligible to participate. The primary nurse (as designated by the unit supervisor) and the primary physician (as designated by the patient record and existing lists) for each patient were requested to participate. An informed consent was obtained from all respondents.

Data were collected from 215 patients (96 transplant, 52 incenter hemodialysis, 37 home hemodialysis, and 30 CAPD). As well, data relating to these patients were collected from 7 physicians and 42 nurses. Nine patients and one nurse refused to participate in the study.

Setting

All patients received care and treatment at an outpatient clinic at a major teaching hospital in western Canada. The renal failure program for the region operated from this hospital. All currently available treatment modalities were offered at this facility. All patient interviews were conducted in a private room near the clinic generally prior to the appointment with the physician. Patients receiving incenter hemodialysis were interviewed on the dialysis unit, shortly after their treatment had been initiated. Interviews with physicians and nurses were held at times and places convenient to them.

Procedure

When the patient arrived for the appointment, a written consent was obtained. A few demographic characteristics were recorded. The investigator provided instructions for completion of three of the instruments. The patient completed the questionnaires in writing.

The investigator then verbally administered the final instrument, the health state utility (time trade off technique). It took approximately 15 minutes to administer the instruments.

The physician and nurse who were most involved with the patient were then contacted to arrange a mutually convenient time, generally within the next seven days, to complete the instruments. The investigator then administered the instruments to the health care professionals in the same fashion as with the patients. In order to minimize the inconvenience for the health care professionals, efforts were made to coordinate the interviews so that health care professionals could complete QOL measures for four to five patients in a one hour session. After experience with several groups of questionnaires, two physicians indicated that they preferred to complete the questionnaires independently at their convenience. The investigator left copies of the instruments with these participants. In some instances, this resulted in a delay of up to a month in the completion and return of the questionnaires. These physician subjects were asked if the condition of the patient and his/her QOL had changed in the interim. If so, the data from the physician were discarded; the gaps were treated as missing data. This situation occurred with the physicians' data for approximately 30 patients. Data were also missing in several cases because the physician or nurse did not believe that he/she knew the patient well enough to make an assessment. Also, in three cases, patients died shortly after their interviews, before the nurse and/or physician were able to complete their questionnaires. In total, physicians' data were missing for 44 patients, and nurses' data were missing for 21 patients.

Instruments

The instruments selected for the study (except for the QOL Index) were chosen because they are brief, easy to administer, focus on overall life satisfaction (as opposed to domain-specific life satisfaction), and have been used and tested with patients with ESRD. Four instruments were administered: The Self-Anchoring Striving Scale (Cantril, 1965), the Index of Well-Being (Campbell, et al., 1976), the Health State Utility/Time Trade-Off Technique (Churchill, et al., 1984), and the QOL Index (Spitzer, et al., 1981). The first three instruments were used as indicators of overall life satisfaction. Dimensions of the last instrument, the QOL Index, were used individually in regression equations as independent variables predicting QOL since the instrument as a whole does not appear to reflect life satisfaction.

The instruments (except for the QOL Index) were developed as self-report measures. Minor modifications in wording were made to facilitate administration of the instruments to the health care providers. These changes generally involved wording such as "If you were Mr. X, how would you rate your present life...". It was recognized that other possible wording could have been used (e.g., "What is Mr. X's quality of life? and How do you think Mr. X would rate his quality of life?). However, for the purposes of this study, it was decided to utilize the first wording, since it seemed, during pretesting, that reliable and valid responses would be elicited. On the whole, the health care providers had no difficulty with the interpretation of this question. Three physicians requested clarification of the question and were then able to proceed without any apparent difficulty.

Index of Well-Being

The Index of Well-Being (see Appendix 1) was developed by Campbell et al. (1976) for a nationwide survey of the quality of American Life. In this survey, a comprehensive inventory was used to assess levels of satisfaction and dissatisfaction in various domains of life. The Quality of American Life inventory incorporates a global assessment of well-being (i.e., the Index of Well-Being) as well as an assessment of satisfaction in various domains of life. The Index of Well-Being is a seven point semantic differential scale. Campbell et al. (1976) included eleven items in the Index of Well-Being. Ten items were bipolar adjective pairs, such as boring and interesting, full and empty, lonely and friendly, etc. The subjects would use these items to describe their lives. Campbell and his colleagues found that two of the adjective pairs (free vs. tied down and easy vs. hard) had lower correlations with other items than would be expected. Hence these two items were deleted from the Index. The remaining eight adjective items have been combined to form the Index of General Affect. Evans et al. (1985) used this Index as another indicator of subjective QOL. The last item on the Index of Well-Being is a measure of overall satisfaction with life. This question is weighted 1.1 times the other questions in the calculation of the Index of Well-Being. This weighting was based on findings from a canonical correlation analysis and from the standard deviations of the components (Campbell, et al. 1976, p. 50). For the entire Index of Well-Being, the stability reliability ranged from .42 to .67 on various items over an eight month period of time. The concurrent validity score of the items measuring satisfaction with various domains of life was found to be .72 in relation to the Index of Well-Being. Although this instrument was not specifically designed for use with patients with chronic illnesses, Evans et al. (1985) successfully used the Index of Well-Being with ESRD patients.

Self-Anchoring Striving Scale

Cantril's (1965) Self-Anchoring Striving Scale (see Appendix 2) is a measure of life satisfaction that has been used extensively in both normal and patient populations. Jackle (1974) and Stegman, Duncan, Pohren, and Sandstrom (1985) have used this instrument with ESRD patients. It has been used in 13 countries including Canada and the U.S. It consists of a ladder with rungs which depict the best to worst possible life. Individuals identify where they believe they are on the ladder, thereby indirectly reflecting their satisfaction with their lives. The scale was administered repeatedly to Americans between 1959 and 1974. No changes in the subjects' ratings of their life satisfaction were observed over time. Although one might expect increased satisfaction with increased standard of living, Campbell et al. (1976) hypothesized, in relation to Cantril's finding of no change in life satisfaction, that individuals adjust their expectations in response to changes in their life situation. Their changed expectations are then reflected in their ratings of satisfaction with their lives.

According to Cantril, the reliability of this instrument gains strength from the standpoint that "all ratings are anchored within an individual's own reality world" (1965, p. 25). That is, the subject defines the range of satisfaction. Since the extremes are entirely personal, the meaning of the endpoints is relatively constant for an individual over time, minimizing error variance. Cantril demonstrated content validity by conducting approximately 3000 interviews. He obtained qualitative comparisons with elements that comprise a satisfying life.

Health State Utility Time Trade Off Technique

Another type of QOL measure, the health state utility (see Appendix 3), is based on individual utility maximization (Gillingham & Reece, 1980). Preferences of individuals for different states of health are identified. Individuals' preferences are represented on a scale from 0 (representing an extremely low QOL in those patients for whom death is preferable to their present life) to 1.0 (where present health state is equivalent to their perception of perfect health). This strategy presents the subject with two scenarios. Subjects are asked which alternative is preferred (e.g., life on dialysis for an indefinite period, or life in perfect health for 30 years). After an initial preference is stated, the time periods are adjusted until the subject no longer has a preference (e.g., life on dialysis for an indefinite period, or life in perfect health for 25 years, etc.). This point is known as the "trade-off" point. A utility score is then calculated (by dividing the trade off point by the remaining life expectancy), reflecting the desirability of living in a particular situation or health state, compared to death and perfect health (Churchill, Morgan, & Torrance, 1984; Sackett & Torrance, 1978). Life expectancy was obtained from life tables (based on actuarial survival curves) for the province of Alberta for the gender of the patient under study.

Test-retest reliability of the health state utility measure, when the tests were administered six weeks apart was .63. Recalculation excluding two outliers yielded a correlation of .80 (Churchill, et al., 1984). In order to demonstrate concurrent validity of the measure, the utility score was correlated with the ratings of two nephrologists caring for patients. The physicians were asked to score the patients' QOL on a five point ordinal scale with one being the worst and five the best possible life. The correlation between the utility scores and the mean scores for the nephrologists was .51. This test of validity may well be inappropriate since one cannot necessarily expect that the perceptions of physicians and patients will be congruent. In a later study, Churchill et al. (1987) tested concurrent validity using a visual analogue scale and a modified Spitzer QOL Index. The correlation score was .22 with the visual analogue scale and .43 for the QOL Index. Some evidence was obtained for discriminant construct validity.

Quality of Life Index

Spitzer and his colleagues (1981) (see Appendix 4) developed a brief quantitative index (QOL Index) to measure the quality of life of patients receiving treatment for cancer and other chronic illnesses. This instrument was designed for use by physicians and can be completed in less than one minute. It consists of five items relating to activity, daily living, health, support, and outlook. Scores for each item range from zero to two.

As discussed previously, this index was not used as a measure of QOL in this study because QOL was conceptualized as overall life satisfaction. Instead, each item of the index (i.e., activity, daily livng, health, support, and outlook) was treated as an independent variable. Unfortunately, no efforts had been made to test the reliability or validity of each of these items individually, prior to this study.

Hypotheses

The hypotheses for this study were that:

1. The physicians' and nurses' perceptions of the quality of life of the patients with ESRD will differ from the perceptions of the patients themselves.
2. The perceptions of the nurses regarding the QOL of the patients with ESRD will differ from the perceptions of the physicians.

3. The patients' perceptions of their QOL will be explained largely by their treatment modality, health status, functional status, outlook, and support, and to a lesser extent by other variables such as their age, sex, education, diagnosis, length of experience with illness, and length of experience with treatment.

4. Perceptions of each group of health care providers will be explained by the health care providers' age, educational background, length of experience in the occupational role, and the assessment of the confidence they have in their ratings of the patients' QOL.

5. Differences in perceptions between patients and health care providers will be explained by the patients' age, sex, education, length of experience with the illness, length of experience with the treatment, health status, functional status, treatment modality, and by the care providers' age, sex, education, length of experience in their occupational roles, and confidence in their ratings.

Operational Definitions

Perception of quality of life is the reported degree of satisfaction or dissatisfaction of an individual regarding life in general, as measured by the Index of Well-Being (Campbell, Converse, & Rodgers, 1976), the Health State Utility Score (Time Trade Off Technique) (Churchill, Torrance, & Morgan, 1984), and the Self-Anchoring Striving Scale (Cantril, 1965).

End stage renal disease is the state of renal failure, where the glomerular filtration rate is less than 5 milliliters per minute and the patient is receiving treatment by dialysis or transplantation.

Role refers to the self-reported occupation (i.e., physician or nurse) of the health care providers and the sick role for patients.

Length of experience in role refers to the length of time, in years, reported by the subject, that he/she has spent in that occupation as a health care provider.

Length of experience with the illness refers to the length of time, in months, reported by the patient, that he/she has been aware of his/her renal disease.

Length of experience with treatment refers to the time, in months, reported by the patient that he/she has received or undergone his/her current treatment (i.e., home hemodialysis, incenter hemodialysis, continuous ambulatory peritoneal dialysis, or transplant).

Treatment modality refers to the type of therapy that the patient is currently receiving for his/her ESRD. The types of treatment available at the time the study was started were: incenter hemodialysis, home hemodialysis, continuous ambulatory peritoneal dialysis, and transplantation.

Incenter hemodialysis is an extracorporeal treatment for ESRD in which blood is passed through an artificial kidney in order to rid the body of nitrogeneous wastes and excess fluid. This treatment is conducted in the hospital setting on a regular (i.e., twice or thrice weekly) schedule.

Home hemodialysis is an extracorporeal treatment for ESRD is which blood is passed through an artificial kidney; this treatment is conducted in the home with the assistance of a family member or paid helper.

Continuous ambulatory peritoneal dialysis (CAPD) is a treatment for ESRD whereby nitrogeneous wastes and excess fluid are removed when a dialysate solution is infused into and drained from the peritoneal cavity several times daily; this treatment is conducted in the home.

Transplantation refers to the implantation of a donor organ (in this situation, kidney) into a recipient for the purposes of restoring renal function.

Confidence of rating refers to the nurses' and physicians' assessments of the accuracy of their rating of the patients' QOL, from absolutely confident to not at all confident, as measured on a six point ordinal Likert scale item.

Health status refers to the reported state of physical and/or emotional wellness, as measured on a three point ordinal scale by the "Health" dimension of the QOL Index (Spitzer, et al., 1981).

Functional status refers to the level of activity performed by a patient in his daily life and is measured on a three point ordinal scale by the "Daily Living" and "Activity" dimensions of the QOL Index.

Outlook refers to an opinion regarding the future state or situation of the patient as measured on a three point ordinal scale by the "Outlook" dimension of the QOL Index.

Support refers to the strength of family relationships and friendships and to the assistance received from others, as measured on a three point ordinal scale by the "Support" dimension of the QOL Index.

Age refers to the number of years a person has lived, as measured in years.

Sex refers to the gender of the individual and was measured as a nominal dichotomous variable.

Education refers to the number of years of formal instruction that an individual reports that he/she has obtained.

Renal diagnosis refers to the specific designation of a disorder or disease in the etiology of the patient's renal failure, as reported by the patient or as recorded on the chart.

Morbidity refers to the number of times the patient has been admitted to hospital in the last 12 months.

Ethical Considerations

Participation in the study was totally voluntary for all subjects. The investigator explained the purpose of the study to all health care workers, in small groups or individually. Patients were told that the study dealt with the QOL of patients with chronic kidney disease. A written informed consent was signed by all participants and witnessed. An information sheet was left with each patient. All subjects were told that upon completion of the study, they would receive a summary of the report.

All data remained confidential; no names or identifying information appear on the data collection forms or in any report. All subjects were free to withdraw from the study at any time, and were told that they could refuse to answer any questions.

Approval to conduct the study was obtained from the Division of Nephrology of the Department of Medicine at the University of Alberta Hospitals. As well the study was approved by the Nursing Research Review Committee of the University of Alberta Hospitals, the Medical Ethics Committee of the Faculty of Medicine, University of Alberta, and the Special Services and Research Committee for the University of Alberta Hospitals. In light of this review process, the requirement for ethical review within the Department of Sociology, University of Alberta was waived.

Data Analysis

The procedures used to analyze the data are briefly outlined in the following paragraphs. Results of the analyses are described in Chapter IV, Presentation of Findings. Findings related to use of statistical modeling techniques are presented in Chapter V.

Pre-testing was conducted with 20 patients (and their nurses and physicians) to ensure the suitability of the instruments. In order to test the stabilty reliability of the measure, these 20 patients and their health care providers were asked to complete the measures a second time, six weeks after the first administration. Only patients who had not experienced significant changes in condition (as judged by the primary physician or nurse) were eligible to participate in the second interview. It was recognized that these measures are situationally dependent and that the retest reliability would diminish with time.

In order to describe the internal consistency reliability of the Index of Well-Being, an interitem correlation matrix was generated and Cronbach's alpha was computed. Because the other two instruments consist of single items, it was not possible or necessary to describe internal consistency.

Concurrent validity was demonstrated by correlating results of each pair of QOL measures. The measures were examined for discriminant validity by comparing QOL of the dialysis and transplant patients. Considerable evidence supported the proposition that renal transplant recipients have a better QOL than do dialysis patients, and that incenter hemodialysis patients have a poorer QOL than do CAPD and home hemodialysis patients. Hence, it was predicted, a priori, that transplant patients would score highest on the measures, and incenter hemodialysis patients would score lowest. A univariate analysis of variance was used to identify whether there were significant differences between the groups. LISREL was also used to examine the measurement structure of the variables.

For each of the patient groups (incenter hemodialysis, home hemodialysis, CAPD, and transplant), descriptive statistics (i.e., mean, standard deviation, frequencies, histograms) were generated for each of the quality of life measures, and where appropriate, for the demographic characteristics. As well, these analyses were conducted for the total sample. Similarly, descriptive statistics were also calculated from ratings provided by nurses and physicians for each group of patients and for the total sample. The variance of scores provided by each physician and nurse were examined for response sets.

A correlation matrix was generated using all variables. That is, each QOL measure was correlated with the other QOL measures and the medical and demographic variables.

In order to determine whether differences exist between QOL assessments of patients and each group of health professionals, Hotelling's t square test was used. This statistical model enables one to compare vectors of means, thereby reducing error variance (Morrison, 1976). In order to determine where specific differences lie, paired (or dependent) t tests were used. The level of significance was set at .05. Given that the relationships between the scores of the care providers and scores of patients could have been low, even if the mean scores between the groups were similar, correlations between the QOL scores of physicians and patients, physicians and nurses, and nurses and patients were also examined.

In order to explain the patients' perceptions of their QOL, multiple regression analysis was used, regressing the QOL scores against the independent variables (i.e., treatment modality, health status, functional status, outlook, support, age, sex, education, diagnosis, experience with illness, experience with treatment, and morbidity). The data were examined for interactions and non-linearity. Separate equations were examined for each QOL measure.

In order to explain the perceptions of nurses and physicians, multiple regression analyses were used, regressing the care providers' perceptions of QOL (individual measure and component indicators of the Index of Well-Being) against such variables as the care provider's sex, age, education, length of experience in the occupational role, and confidence in their ratings. Again, the data were examined for interactions and non-linearity.

Several procedures were used to explain the differences in perceptions between the patients and nurses, patients and physicians, and physicians and nurses. These analyses are described in Chapter IV.

Summary

A cross-sectional survey design was used to compare and explain perceptions of QOL of patients, physicians, and nurses regarding QOL of patients with ESRD. A convenience sample was used, consisting of 215 English-speaking adult patients with ESRD and the 7 physicians and 42 nurses who were the primary caregivers for these patients. Four instruments were administered to all subjects and medical and sociodemographic data were collected. A series of descriptive and inferential statistics were generated and findings are described in Chapter IV.

IV. PRESENTATION OF THE FINDINGS

Introduction

The findings of this study are described in the order of the research questions. The characteristics of the study sample are described first. This will be followed by a discussion of the reliability and validity of the measures. Next, descriptive statistics are presented and the patients' perceptions of their QOL are compared with those of their physicians and nurses. Also, the nurses' perceptions are compared with those of the physicians. Finally, the factors that affect patients', nurses', and physicians' perceptions, and differences in perceptions between care providers and patients are discussed.

Characteristics of the Sample

Patients

A total of 215 patients with ESRD were entered into the study. Ninety-six patients had received renal transplants, 52 were receiving incenter hemodialysis, 37 were receiving home hemodialysis, and 30 were on continuous ambulatory peritoneal dialysis. The mean age of the patients was 45.6 years (see Table 4.1), with a range from 18 through 85 years. Sixty-six percent of the patients were male and 61.4% were married or living in a common-law relationship (see Table 4.2). On average, the patients had received 11.5 years of formal education, with a range from 4 to 21 years. There was a wide range

Table 4.1

Characteristics of Patients for Total Group and for Each Treatment Group

Characteristic	Total Group		Transplant		Incenter Hemodialysis		Home Hemodialysis		Continuous Ambulatory Peritoneal Dialysis	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Age	45.60	14.28	42.08	12.17	48.19	15.05	48.90	16.55	47.93	13.50
Years of formal education	11.52	3.18	12.03	3.15	11.32	3.44	10.41	3.13	12.03	2.66
Length of time on treatment in months	41.67	41.03	48.37	44.79	43.78	40.32	37.69	40.64	24.83	21.50
Number of admissions to hospital in last year	1.41	1.69	1.02	1.49	1.68	1.83	1.96	1.73	1.43	1.79
Length of time since illness diagnosed in years	10.27	8.67	11.22	7.29	10.57	8.93	9.93	10.69	7.43	8.54
	n=215		n=96		n=52		n=37		n=30	

Table 4.2

Characteristics of Patients for Total Group and Each Treatment Group

Characteristic	Total Group		Transplant		Incenter Hemodialysis		Home Hemodialysis		Continuous Ambulatory Peritoneal Dialysis	
	n	%	n	%	n	%	n	%	n	%
Gender: Male	142	66	63	65.6	32	61.5	28	75.7	19	63.3
Female	73	34	33	34.4	20	38.5	9	24.3	11	36.7
Marital Status: Married	130	60.5	59	61.5	30	57.7	22	59.5	19	63.3
Common-law	2	.9	1	1.0	4	7.7	0	0	0	0
Single	51	23.7	20	20.8	14	26.9	12	32.4	5	16.7
Divorced	12	5.6	9	9.4	1	1.9	1	2.7	1	3.3
Widowed	9	4.2	5	5.2	2	3.8	1	2.7	3	10
Separated	10	4.7	1	1.0	1	1.9	1	2.7	2	6.7
Diagnosis: Glomerulonephritis	57	26.5	36	37.6	4	8.5	11	29.7	6	20
Diabetes	26	12.1	10	10.4	8	15.4	3	8.1	5	16.7
Pyelonephritis	12	5.6	5	5.2	3	5.8	2	5.4	2	6.7
Polycystic Kidneys	19	8.8	5	5.2	7	13.5	6	16.2	1	3.3
Other	71	31.6	26	26.8	27	51.9	9	24.3	11	36.7
Unknown	33	15.3	15	15.5	3	5.8	6	16.2	5	16.7
	n=215		n=97		n=52		n=37		n=30	

of treatment time, from one month to over 16 years. The mean length of experience with the treatment modality was 4.17 months. On average, the patients had been diagnosed as having renal disease 10.3 years prior to participation in the study. The mean number of admissions to hospital in the last year, for all treatment groups was 1.41. In Table 4.2, the conditions leading to renal failure in these patients are identified. This distribution is not unlike that of other patients with ESRD in Canada (Schriel, et al., 1985). In particular, it was noted that the proportion of diabetic patients (prone to a number of serious multi-system complications) was 12.1% of the entire sample. It should be noted that none of the patients in this study were or had been receiving recombinant erythropoietin therapy, since this drug was not available at the time the study was conducted.

The patients' characteristics have also been examined by treatment group (refer again to Table 4.1). As would be expected, the transplant group was younger, with a mean age of 42 years. The patients in the home hemodialysis group reported receiving the least formal education, 10.41 years on average. The CAPD patients had reported the least experience with their treatment modality. The mean length of experience with the treatment was 24.8 months. This finding can be explained by the fact that CAPD is the newest treatment modality (started in this center in 1980); also as a result of the complications associated with this treatment, changes in treatment modality are not uncommon after a period of time on CAPD. On the whole, the CAPD patients also had the shortest length of experience with their illness ($\overline{X}$=7.43 years). The home hemodialysis patients reported the highest number of admissions to hospital in the last year ($\overline{X}$=1.96); the transplant recipients reported the lowest number of admissions ($\overline{X}$=1.02) to hospital.

From Table 4.2, it is evident that there was a higher proportion of male than female patients in the sample. This distribution is typical of the population of patients with ESRD (Schriel, et al., 1985). Marital status does not appear to differ markedly between the treatment groups. There was a somewhat higher proportion of diabetic patients in the CAPD and incenter hemodialysis groups (16.7% and 15.4% respectively).

Nurses

Forty-two nurses participated in the study. They ranged in age from 24 to 58 years ($\overline{X}$=36.6 years) (see Table 4.3). On average, they had received 15.2 years of formal education. Twelve of the nurses had received a baccalaureate degree in nursing. They tended to be experienced, with a mean of 11.1 years of nursing experience. All of the nurses were female.

Physicians

Seven physicians participated in the study. They ranged in age from 38 to 59 years, with a mean age of 47.5 years (see Table 4.4). All of the physicians had completed specialty training in nephrology, and two had also completed PhD degrees. On average, they had received 23.3 years of formal education. The mean length of experience in their current occupational role was 15 years. All but one of the physicians was male.

Table 4.3

Characteristics of Nurses (n = 42)

Characteristic	Mean	SD	Range
Age	36.55	9.27	24-58
Years of formal education	15.21	.81	13-17
Years in current occupation	11.05	7.27	1-30

Table 4.4

Characteristics of Physicians (n = 7)

Characteristic	Mean	SD	Range
Age	47.50	6.83	38-59
Years of formal education	23.29	.76	23-25
Years in current occupation	15.00	8.76	1-25

Reliability and Validity of Measures

Stability Reliability

In order to test the stability reliability of the measures, 20 patients and their health care providers were asked to complete the instruments a second time, approximately six weeks after the first administration. Only patients who had not experienced significant changes in their condition (as judged by the patient, physician, nurse, or investigator) were eligible to participate in the second interview. Pearson correlation coefficients were computed for each pair of measures. It was found that the Self-Anchoring Striving Scale was relatively stable with a correlation of .79 for both patients' and nurses' reports (see Table 4.5). Similarly, the trade off point (used in the calculation of the time trade off or health state utility score), was relatively stable with a correlation of .85 for patients' ratings at the first administration of the questionnaire and ratings obtained after six weeks. Nurses' and physicians' reports of the trade off point were also stable (r=.91 and .81 respectively). The various items from the Index of Well-Being were less stable, with correlations of scores from the first test and retest ranging from .04 to .69 on the individual items. The items with lower stability reliability are those that appear to be more likely to change over time or with changes in emotional state (i.e., life is enjoyable or miserable, easy or hard, full or empty). For instance, one day an individual may feel that she/he is enjoying life and the next day if he/she feels unwell, he

Table 4.5

Stability Reliability of Measures After Six Weeks (n = 20)

	Patients' Reports	Nurses' Reports	Physicians' Reports
	r	r	r
Self-Anchoring Striving Scale	.79	.79	.75
Trade Off Point[1]	.85	.91	.81
Items from Index of Well-Being			
Interesting	.49	.78	.75
Enjoyable	.04	.68	.73
Easy	.07	.43	.61
Worthwhile	.67	.91	.51
Friendly	.67	.81	.78
Full	.13	.87	.85
Hopeful	.48	.88	.69
Free	.69	.83	.66
Rewarding	.52	.76	.80
Brings out Best in Me	.62	.50	.66
Overall life satisfaction	.15	.50	.85
Overall Index of Well-Being	.42	.86	.85
Overall Index of General Affect	.53	.94	.85
Selected Independent Variables			
Functional status (ability to work)	.27	.24	.61
Functional status (ability to perform ADL)	.39	.32	.77
Health status	.79	.70	.48
Support	.56	.37	.39
Outlook	-.09	.32	.26
Confidence in scoring	N/A	.75	.83

[1] used to calculate Time Trade Off

may perceive that life is miserable. Hence, one might expect lower retest correlations on these items. The correlation of the total Index of Well-Being for scores obtained on the first and second administration was .42. The test-retest reliability for the Index of General Affect, as a whole, was .53. Nurses' and physicians' reports on these measures were more stable than those of the patients with test-retest correlations ranging from .85 to .94. The stability reliability of some of the independent variables, namely functional status, health status, support, outlook, and confidence in scoring ranged from -.09 on outlook to .79 on health status. It was expected that the test-retest reliability on many of these items would be low, since feelings and attitudes tend to be transient and factors related to quality of life changes over time.

Internal Consistency of the Index of Well-Being

An inter-item correlation matrix was generated to describe the internal consistency reliability of the Index of Well-Being. The intercorrelation of the items ranged from .28 to .72 (see Table 4.6). Two of the semantic differential items ("easy" vs "hard" and "free" vs "tied down") did not correlate as highly with other items as did the other eight adjective items. This finding was consistent with that of Campbell, et al. (1976, p. 39), and following the example of Campbell and his colleagues, these two items were not included in the calculation of the Index. After exclusion of these two items, the remaining intercorrelations averaged about .50.

Table 4.6

Correlation Matrix: Items in Index of Well-Being

Variables	Interesting	Enjoyable	Easy	Worthwhile	Friendly	Full	Hopeful	Free	Rewarding	Brings Out Best in Me	Overall Life Satisfaction
Interesting	1.0										
Enjoyable	.53	1.0									
Easy	.31	.45	1.0								
Worthwhile	.51	.54	.27	1.0							
Friendly	.36	.38	.35	.40	1.0						
Full	.60	.51	.41	.54	.49	1.0					
Hopeful	.36	.49	.38	.55	.42	.52	1.0				
Free	.36	.47	.33	.40	.28	.37	.50	1.0			
Rewarding	.50	.60	.43	.59	.51	.54	.62	.55	1.0		
Brings Out Best In Me	.46	.61	.40	.56	.40	.49	.51	.50	.61	1.0	
Overall Life Satisfaction	.55	.56	.45	.59	.42	.60	.60	.55	.72	.68	1.0

It was interesting to note that the inter-item correlation matrices generated from the reports of nurses and physicians were different from those of the patients. The correlations between all 11 items from the nurses' reports ranged from .46 to .81 (see Appendix 5) and from the physicians' scores ranged from .39 to .79 (see Appendix 6). That is, the health care providers, particularly the nurses, were more consistent than the patients in their responses on the items of the Index. The patterns of relationships between the items are, on the whole, similar to those of the patients.

Alpha coefficients were also computed for the Index of Well-Being. The alpha was .91 for the patients' reports. As would be expected from the correlation matrices, the nurses' and physicians' ratings demonstrated greater consistency, with an alpha of .96 for the nurses' consistency of scoring on the Index of Well-Being and an alpha of .95 for the physicians' ratings.

Separate alpha coefficients were computed for the 11 item index and the reduced 9 item index. No differences were evident in the alpha coefficients (to two decimal places). That is, the total 11 item index demonstrated as much internal consistency as the final nine item index. However, it was decided that, for the purposes of further analysis, the nine item index would be used, in order to facilitate comparisons with other research findings.

Concurrent Validity

In order to describe concurrent validity, a correlation matrix was generated for all the dependent measures of quality of life (see

Table 4.7). The component measures of the Index of Well-Being, namely the Index of General Affect and the Overall Life Satisfaction item were examined as dependent variables. However, because these measures correlated so highly (.92 and .96 respectively) with the total Index of Well-Being, most of the reports and discussions that follow will be limited to three measures of quality of life, namely Cantril's Self-Anchoring Striving Scale, the Index of Well-Being and the Time Trade Off (Health State Utility Score).

Correlations between the dependent variables (excluding the Index of General Affect and Overall Life Satisfaction Item) ranged from .44 to .65. While these correlations suggest that there are significant relationships between the variables, it is also apparent that the instruments are not necessarily measuring the same thing. Since there is, at present, no gold standard for measuring quality of life, it is not clear which instrument is best. For the purposes of other analyses, the items were analyzed individually rather than summated or otherwise combined. A further examination of the measurement structure (using LISREL) is included in Chapter V.

Discriminant Validity

It was predicted, a priori, based on existing literature, that transplant recipients would have higher QOL scores than dialysis patients, and that incenter hemodialysis patients would have lower QOL scores than CAPD and home hemodialysis patients. From Table 4.8, it is evident that transplant recipients, do in fact have higher scores on all measures of QOL than do the dialysis patients. Results

Table 4.7

Correlation Matrix: Dependent Measures of QOL (Patient Reports)

Variables	SASS[1]	IWB[2]	IGA[3]	LS[4]	TTO[5]
SASS[1]	1.00	.65	.66	.59	.44
IWB[2]		1.00	.92	.96	.47
IGA[3]			1.00	.77	.47
LS[4]				1.00	.41
TTO[5]					1.00

n = 215

Key

[1] SASS - Cantril's Self-Anchoring Striving Scale

[2] IWB - Index of Well-Being

[3] IGA - Index of General Affect

[4] LS - Overall Life Satisfaction Item

[5] TTO - Time Trade Off (Health State Utility Score)

Table 4.8

Quality of Life Scores of Total Group and Each Treatment Group

	Total Group		Transplant		Incenter Hemodialysis		Home Hemodialysis		Continuous Ambulatory Peritoneal Dialysis	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Cantril's Self-Anchoring Striving Scale[1]	6.37	2.13	7.36	1.88	5.65	1.90	5.68	2.07	5.30	2.04
Index of Well-Being[2]	10.03	2.91	11.29	2.50	7.04	2.28	8.85	2.55	8.84	3.33
Index of General Affect[3]	4.93	1.26	5.47	1.04	4.44	1.27	4.51	1.16	4.44	1.31
Overall Life Satisfaction[4]	4.57	1.72	5.29	1.49	4.26	1.49	3.87	1.49	3.70	2.12
Time Trade Off (Health State Utility Score)[5]	.61	.31	.76	.25	.39	.32	.61	.29	.53	.28
	n=215		n=96		n=52		n=37		n=30	

[1] $F = 15.334$ $p < .001$ (df=213)

[2] $F = 13.197$ $p < .001$ (df=207)

[3] $F = 17.643$ $p < .001$ (df=207)

[4] $F = 12.602$ $p < .001$ (df=213)

[5] $F = 18.346$ $p < .001$ (df=199)

from the univariate analysis of variance reveal that there are statistically significant differences between the groups (p<.001). However, results obtained for the groups of dialysis patients are not as clear. The Time Trade Off Technique (Health State Utility Score) appears to discriminate best between the modes of dialysis treatment. As predicted, incenter hemodialysis patients scored lower on the Time Trade Off (TTO) than did CAPD and home hemodialysis patients. Similarly, on the Index of Well-Being, incenter hemodialysis patients scored lower than did CAPD and home hemodialysis patients. However, on Cantril's Self-Anchoring Striving Scale (SASS), CAPD patients scored lower than did incenter and home hemodialysis patients. It is not entirely clear whether this finding is indicative of a lack of discriminatory power of the SASS or whether in fact, differences in QOL between groups of dialysis patients are negligible and not in the direction that was predicted. Using t-tests for differences between means, CAPD and incenter hemodialysis patients did not differ statistically on the measures of QOL, except the TTO. Similarly, mean scores of home hemodialysis and incenter hemodialysis patients were not statistically different, except for the TTO. Furthermore, there were no statistically significant differences between mean QOL scores of CAPD and home hemodialysis patients on any of the measures, including the TTO.

Descriptive Statistics

The descriptive statistics for each of the QOL measures are provided in Table 4.9 for the patients' reports, Table 4.10 for the

Table 4.9

Descriptive Data for QOL Instruments (Patients' Scores)

Descriptive Statistic	Cantril's Self Anchoring Striving Scale	Index of Well-Being	Time Trade Off (Health State Utility)
Possible range of each item	10	7	1.0
Range of scores possible on scale	0-10	2.1-14.7	0-1.0
Observed range	0-10	2.5-14.7	0-1.0
Mean	6.37	10.03	.611
Median	6.00	10.26	.63
Mode	5.00	8.40	1.00
Standard deviation	2.13	2.91	.31
Standard error (SE)	0.15	.20	.02
Skewness	-0.06	-.44	-.38
SE skew	0.17	.17	.17

Table 4.10

Descriptive Data for QOL Instruments (Nurses' Scores)

Descriptive Statistic	Cantril's Self Anchoring Striving Scale	Index of Well-Being	Time Trade Off (Health State Utility)
Possible range of each item	10	7	1
Range of scores possible on scale	0-10	2.1-14.7	0-1.0
Observed range	0-10	2.35-14.7	.02-1.0
Mean	6.27	9.63	.49
Median	7.00	9.77	.47
Mode	7.00	14.70	1.00
Standard deviation	1.74	3.30	.30
Standard error (SE)	.12	.24	.02
Skewness	-.68	-.21	.11
SE skew	.17	.186	.17

nurses' reports, and Table 4.11 for the physicians' reports. The patients' mean rating of their QOL on the Self-Anchoring Striving Scale was 6.37. This is only slightly lower than the mean score of 6.6 of a general American population (Cantril, 1965). As is typical of data of this nature, the distribution is negatively skewed. That is, fewer people reported ratings on the lower end of the scale.

On the Index of Well-Being, the patients' mean score was 10.03. This score is again somewhat lower than the mean score of 11.77 obtained by Campbell et al. (1976) in a general American population. Overall, the mean score of patients on the Time Trade Off was .61.

As might be expected, there are differences in mean scores obtained from the nurses and physicians. These will be described later in this chapter.

The distribution of scores obtained from each physician and selected nurses (i.e., those that had ten or more patients) were examined to check for response sets (see Table 4.12). While there are some differences in mean scores of the various health care providers, it was recognized that these differences may be a result of the differences in case mix of the care providers. That is, some care providers had only transplant patients, or had a lower proportion of dialysis patients in their case load. The dialysis patients would be expected to have a lower QOL than the transplant pati[illegible] The standard deviations of the scores obtained from ph[illegible] and nurses were similar for those care providers that had [illegible]r case loads.

Table 4.11

Descriptive Data for QOL Instruments (Physicians' Scores)

Descriptive Statistic	Cantril's Self Anchoring Striving Scale	Index of Well-Being	Time Trade Off (Health State Utility)
Possible range of each item	10	7	1
Range of scores possible on scale	0-10	2.1-14.7	0-1.0
Observed range	3-10	3.72-14.7	.02-1.0
Mean	6.86	10.05	.59
Median	7.00	10.37	.62
Mode	7.00	10.37	1.00
Standard deviation	1.49	2.48	.23
Standard error (SE)	.12	.19	.02
Skewness	-.36	-.367	-.12
SE skew	.20	.19	.19

Table 4.12

Distribution of Scores of Selected Care Providers

Code Number	SASS			IWB			TTO			No. patients
	Mean	SD	Range	Mean	SD	Range	Mean	SD	Range	
Physician 1	7.26	1.42	6.0	10.00	2.66	10.85	.62	.22	.80	76
Physician 2	5.90	1.28	6.0	9.30	2.00	7.65	.58	.22	.89	34
Physician 3	7.27	1.19	4.0	11.22	2.41	9.37	.67	.32	.96	11
Physician 4	6.58	1.63	6.0	9.49	2.05	7.90	.46	.23	.96	31
Physician 5	7.37	1.40	4.0	11.52	1.90	5.4	.61	.18	.47	8
Physician 6	7.00	1.41	3.0	9.74	3.19	7.65	.70	.25	.59	4
Physician 7	7.72	1.11	3.0	13.41	.89	2.35	.75	.18	.55	7
Nurse 10	7.074	1.21	5.0	7.87	3.47	11.47	.48	.34	.98	27
Nurse 12	4.80	1.75	4.0	7.54	3.14	7.63	.48	.30	.78	10
Nurse 17	6.98	1.13	6.0	12.20	3.01	12.10	.50	.32	.99	60
Nurse 24	6.90	2.23	6.0	9.69	2.31	7.55	.64	.25	.76	11

In order to examine whether individual physicians or nurses rated their patients differently from other patients, a series of multiple regression analyses were performed. The identification numbers of the physicians were treated as dummy variables. Although there were statistically significant differences between the ratings of care providers, these differences disappeared when treatment modality was controlled.

Differences in Perceptions Between Patients and Care Providers

In order to determine whether differences exist between QOL assessments of patients and nurses and patients and physicians, two Hotelling's t-square tests were used. A MIDAS statistical package was used to compute these results. This statistical model enables one to compare vectors of means. In this study, the vectors of means consisted of the mean scores on five QOL measures, namely the Time Trade Off, Cantril's Self-Anchoring Striving Scale, the Index of Well-Being and its component measures, the Index of General Affect and the Overall Life Satisfaction item. From Table 4.13, it is evident that there are statistically significant differences between the QOL scores of the patients and the nurses.

In order to identify where the differences were, a series of paired t-tests were examined (see Table 4.14). Statistically significant differences were found between nurses' and patients' scores on the overall life satisfaction item ($p<.05$) and the Time Trade Off ($p<.001$). On these two measures, nurses' scores were lower

Table 4.13

Hotelling's t-square for Differences Between Patients and Nurses

Measure	Mean Score Patient	Mean Score Nurse
Cantril's Self-Anchoring Striving Scale	6.31	6.26
Index of Well-Being	9.99	9.66
Index of General Affect	4.91	4.86
Overall Life Satisfaction	4.62	4.37
Time Trade Off	.61	.49

T-square = 21.889
df = 5,377 F = 4.3318 sig = .0008

Table 4.14

Paired T Test Results: Differences between Mean Scores of Patients and Nurses

Measure	Patient	Nurse	t	df
Self-Anchoring Striving Scale	6.43	6.26	1.18	198
Index of Well-Being	10.14	9.75	1.55	188
Index of General Affect	4.97	4.89	.72	188
Overall Life Satisfaction	4.62	4.32	2.12*	199
Time Trade Off	.62	.49	4.49***	185

*p < .05
**p < .01
***p < .001

than patients' scores. It should be noted that the mean scores obtained in the t-square analysis and the t-test differ because of missing values. The t-square excludes all cases for which data is missing on any one of the measures.

Although the differences in the mean scores of patients and nurses on the quality of life measures are not large, the correlations of nurses' and patients' scores are relatively low (r=.19 to .47) (see Table 4.15). That is, there is a moderate systematic linear relationship between nurses' and patients' scores.

In order to determine whether differences exist between QOL scores of patients and physicians, another Hotelling's t-square was computed (see Table 4.16). Again, overall, there was a statistically significant difference between the vectors of means for patients and physicians. Paired t-tests were used to identify where (i.e., for which measures) differences existed (see Table 4.17). It was found that there were statistically significant differences in patients' and physicians' ratings on the Self-Anchoring Striving Scale. On this measure, the physicians rated the patients' present QOL higher than did the patients themselves. There were no other statistically significant differences in the QOL scores of physicians and patients. Correlations of physicians' scores and patients' scores ranged from .26 on the Time Trade Off to .45 on the Self-Anchoring Striving Scale and Index of General Affect (see Table 4.15). That is, there was a relatively low association between the physicians' and patients' ratings of the patients' QOL.

Table 4.15

Correlations of Patients', Nurses', and Physicians' Ratings on QOL Measures

Instrument	Patients with Nurses		Patients with Physicians		Nurses with Physicians	
	r	n	r	n	r	n
Cantril's Self-Anchoring Striving Scale	.47*	199	.45**	171	.49***	163
Index of Well-Being	.37***	189	.44***	165	.49***	158
Time Trade Off	.19**	186	.26***	158	.35***	162

*p < .05
**p < .01
***p < .001

Table 4.16

Hotelling's t-square for Differences Between Patients and Physicians

Measure	Mean Score Patient	Mean Score Physician
Cantril's Self-Anchoring Striving Scale	6.31	6.79
Index of Well-Being	9.99	9.94
Index of General Affect	4.91	4.85
Overall Life Satisfaction	4.62	4.63
Time Trade Off	.61	.59

T-square = 14.244
df = 5,338 F = 2.8155 sig = .0166

Table 4.17

Paired T Test Results: Differences between Mean Scores of Patients and Physicians

Measure	Patient	Physician	t	df
Self-Anchoring Striving Scale	6.38	6.90	-3.48***	170
Index of Well-Being	9.94	10.11	-.75	164
Index of General Affect	4.89	4.92	-.20	164
Overall Life Satisfaction	4.48	4.65	-.97	170
Time Trade Off	.62	.59	1.09	157

***p < .001

Differences in Perceptions Between Nurses and Physicians

In order to identify whether there were differences in the perceptions of QOL of nurses and physicians, another Hotelling's t-square and a series of paired t-tests were used (see Tables 4.18 and 4.19). Again, it is apparent that there were statistically significant differences between the QOL scores of physicians and nurses. The physicians rated their patients' QOL higher, on average, on all the measures except the Index of General Affect. On this measure (IGA), the physicians' mean scores were also higher than those of the nurses, although differences were not statistically significant. Referring back to Table 4.15, the correlations of nurses' and physicians' scores on the QOL measures ranged from .35 on the Time Trade Off to .49 for the Self-Anchoring Striving Scale. Again, there was only a moderate relationship between the scores of the groups.

Explanation of Patients' Perceptions of QOL

The patients' perceptions of their quality of life were examined using a series of multiple regression equations. Separate equations were examined for each of the dependent measures of quality of life. All independent variables discussed in the hypotheses were entered into the equations. These included age, sex, marital status, treatment, diagnosis, education, length of experience with treatment, length of experience with illness, number of hospitalizations, functional status (two measures), health status, support, and outlook.

Table 4.18

Hotelling's t-square for Differences Between Nurses and Physicians

Measure	Mean Score Nurse	Mean Score Physician
Cantril's Self-Anchoring Striving Scale	6.27	6.79
Index of Well-Being	9.67	9.94
Index of General Affect	4.86	4.85
Overall Life Satisfaction	4.37	4.63
Time Trade Off	.49	.59

T-square = 37.771
df = 5,333 F = 7.4645 sig = .0000

Table 4.19

Paired T Test Results: Differences between Mean Scores of Physicians and Nurses

Measure	Physician	Nurse	t	df
Self-Anchoring Striving Scale	6.88	6.80	.17	164
Index of Well-Being	10.02	9.57	1.76	159
Index of General Affect	4.87	4.76	.89	160
Overall Life Satisfaction	4.68	4.33	2.45*	165
Time Trade Off	.60	.47	4.74***	164

*p < .05
**p < .01
***p < .001

The nominal variables, treatment, diagnosis, sex and marital status, were treated as dummy variables. All of these variables were dichotomized. Since there were few statistically significant differences in QOL scores of patients receiving the various forms of dialysis therapy, all dialysis treatments were grouped into one category. For patient diagnoses, the responses were recoded into diabetic and non-diabetic groups, since it has been suggested in the literature that diabetics have a lower QOL than do other patients with end stage renal disease. For the purpose of this analysis, marital status was recoded into two categories: married which included common-law relationships and not married which collapsed the categories of single, divorced, separated and widowed.

Since many of the variables did not attain statistical significance ($p<.05$), the equations were reanalyzed entering only the statistically significant predictors. The results obtained from the reduced models are reported in the following pages.

A correlation matrix between all the independent and dependent variables in the equation is reported in Table 4.20. It appears that there was not a problem with multicolinearity for these variables; that is, the independent variables were not highly intercorrelated. The variables that had the highest zero order correlations with the quality of life measures were outlook, functional status (two measures), health status, support, and number of hospitalizations.

Scatter diagrams were examined for curvilinear relationships between dependent and independent variables. There was no evidence to suggest that the relationships were not monotonic and linear.

Table 4.20

Correlation Matrix: Dependent and Independent Variables Related to Patients' Perceptions of their Quality of Life

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1.Age	1.0																
2.Sex	.05	1.0															
3.Diagnosis	-.06	-.00	1.0														
4.Marital status	.22	-.04	.00	1.0													
5.Treatment	.22	-.01	.05	-.03	1.0												
6.Morbidity	.06	-.06	.21	.02	.21	1.0											
7.Length of experience with treatment	-.04	.01	-.19	-.09	-.14	-.20	1.0										
8.Length of illness	.01	.06	-.11	.02	.10	-.16	.36	1.0									
9.Education	-.22	-.02	.03	.09	-.14	-.08	-.05	-.16	1.0								
10.Functional status (ability to work)	-.19	.03	.08	-.09	-.28	-.22	.10	.14	.07	1.0							
11.Functional status (ability to perform ADL)	.18	-.07	-.07	.10	-.24	-.24	.10	.01	.17	.44	1.0						
12.Support	-.06	-.04	-.14	.19	-.12	-.08	-.05	-.06	.13	.22	.25	1.0					
13.Health	-.12	-.04	-.01	-.08	-.35	-.18	.04	-.01	.14	.47	.40	.22	1.0				
14.Outlook	.23	.03	.08	.02	-.13	-.08	-.00	.09	.08	.16	.09	.17	.30	1.0			
15.Time Trade Off	.15	.02	-.14	.24	-.37	-.28	.10	.04	.08	.20	.13	.12	.21	.29	1.0		
16.Index of Well-Being	.11	.02	-.06	.09	-.40	-.26	.05	.07	.08	.37	.25	.32	.44	.52	.44	1.0	
17.Self-Anchoring Striving Scale	.03	.20	-.01	-.01	-.42	-.19	.12	.02	.07	.33	.19	.20	.47	.37	.43	.65	1.0

As well, the data were examined for interactions. A series of cross-product terms were also entered into the regression equation. These terms were selected because literature, theory, or logic supported the possible influence of these factors. They included: age x sex, support x health status, health x functional status, age x outlook, age x functional status, age x length of experience with treatment, length of experience with treatment x morbidity, and age x health status.

The standardized residuals were examined for each regression equation, and for the most part, fell within a normal curve. Outliers were examined for accuracy of coding, and anecdotal notes were checked in an attempt to explain unexpected findings. Because there were relatively few extreme outliers, and because the sample size was relatively large, outliers were not excluded from the analyses.

The regression model explaining patients' perceptions of their quality of life on the Self-Anchoring Striving Scale is shown in Table 4.21. The complete model, including all the independent variables and interaction terms explained 46% of the variance. The reduced model, which includes only statistically significant ($p < .05$) predictors explained 36.4% of the variance of QOL, as measured on the Self-Anchoring Striving Scale. Outlook, health status and treatment modality were found to have significant main effects. A one unit increase on the outlook measure resulted in a .79 unit increase in the predicted value on the Self-Anchoring Striving Scale

Table 4.21

Regression Model for Patients' Perceptions of Quality of Life on Self-Anchoring Striving Scale

Variable	b	standard error	standardized b
Health status	.792***	.210	.247
Treatment	-1.187***	.256	-.277
Outlook	.799***	.212	.224
Age x functional status	.008*	.003	.145
Constant	4.280	.443	

$R^2 = .364$	ANOVA	df	SS	MS
	Regression	4	342.048	85.519
	Residual	203	598.395	2.948

F = 29.009 sig = .0000

*p < .05
**p < .01
***p < .001

(SASS), even when other significant predictor variables were controlled. Similarly, a one unit increase in health status resulted in a .79 unit increase in the predicted score on the SASS. With respect to treatment modality, dialysis patients had a predicted score that was 1.10 units lower on the SASS, when other predictors were controlled, than did transplant patients.

A significant interaction was found between age and functional status. That is, in older persons, functional status had a greater impact on quality of life than in younger persons. Although this finding is statistically significant, it is not likely to be important since the regression coefficient is small and the effect is unlikely to be clinically significant.

The reduced regression model explaining patients' perceptions of their quality of life on the Index of Well-Being is shown in Table 4.22. With the Index of Well-Being (IWB) as a dependent variable, the independent variables and interaction terms explained 53% of the variance of QOL. The reduced equation, including only the significant terms explained 48.0% of the variance of QOL as measured on the IWB. Again, treatment, health status, and outlook were significant predictors of QOL. In addition, support, functional status, and morbidity were significant predictors. A one unit increase in outlook caused the largest change in the prediction of QOL (i.e., 2.05 units) on the IWB, when other variables were controlled. Again, dialysis patients had predicted values of QOL that were 1.5 units lower on the IWB than transplant patients. As might be expected, an increase in the number of hospitalizations,

Table 4.22

Regression Model for Patients' Perceptions of Quality of Life on Index of Well-Being

Variable	b	standard error	standardized b
Morbidity	-.211*	.093	-.123
Treatment	-1.469***	.318	-.251
Support	1.032**	.321	.173
Outlook	2.055***	.258	.421
Functional status (ability to work)	.677***	.201	.187
Constant	5.259	.736	

R^2 = .480	ANOVA	df	SS	MS
	Regression	5	828.652	165.730
	Residual	196	896.931	4.576

F = 36.216 sig = .0000

*p < .05
**p < .01
***p < .001

controlling for treatment and other significant predictor variables, resulted in a slight drop in QOL on the IWB. None of the interaction terms were significant predictors of QOL on the IWB.

For the Time Trade Off (TTO) measure of QOL, the complete model explained 43.1% of the variance of QOL. The reduced model (see Table 4.23) consisting of only the statistically significant predictors, explained 28.8% of the variance. Again, treatment and outlook were significant predictors. As well, marital status was a significant predictor of QOL on the TTO measure. In this situation, a married person (including common-law relationships) was more likely to perceive that he/she had a higher QOL, even when other significant variables were controlled. The number of hospitalizations was also negatively associated with QOL; that is people who had been hospitalized frequently had a lower predicted value QOL, even when other variables such as treatment modality were controlled.

Patients' Perceptions of Quality of Life Including Health Care Professionals' Perceptions as an Independent Variable

Another series of regression analyses were conducted to examine whether the health care providers' perceptions of the patients' quality of life were predictors of the patients' perceptions of their quality of life. It may be that the perceptions of care providers are verbally or nonverbally transmitted to the patients, and that the care providers' perceptions consciously or unconsciously influence the perceptions of the patients. A multiple regression analysis was performed for each of the dependent measures of quality of life. In one set of equations, the nurses' perceptions of the patients'

Table 4.23

Regression Model for Patients' Perceptions of Quality of Life on time Trade Off

Variable	b	standard error	standardized b
Morbidity	-.042**	.013	-.201
Marital status	.152**	.046	.209
Outlook	.139***	.037	.235
Treatment	-.236***	.046	-.331
Constant	.732	.047	

R^2 = .288	ANOVA	df	SS	MS
	Regression	3	5.822	1.941
	Residual	194	19.059	.098

F = 19.059 sig = .0000

*p < .05
**p < .01
***p < .001

quality of life were entered, followed by a series of patient-related independent variables. In another set of equations, the physicians' perceptions of the patients' QOL were entered as an independent variable followed by the other patient-related independent variables (i.e., age, sex, education, marital status, treatment modality, morbidity, length of experience with illness, length of experience with treatment, outlook, support, health and functional status). No interaction terms were entered since on previous analyses, interaction terms were found to be either statistically or clinically insignificant. The complete equations (rather than the reduced equations) are reported in the tables, so that the size of the effects of the health care providers' perceptions can be seen, even when these effects are not significant.

Nurses' perceptions of the patients' QOL on the SASS explained 22.4% of the variance of the patients' QOL. When other explanatory variables were entered into the equation, nurses' perceptions remained a significant predictor of patients' QOL on the SASS. A one unit increase in the nurses' perceptions was associated with a .328 unit increase in the patients' perceptions when other variables were controlled. The total model explained 47.7% of the variance. Other significant predictors included sex, outlook, and health status (see Table 4.24). The patterns of relationships of these variables are similar to those described previously for the patients on this dependent measures of QOL.

The physicians' perceptions of the patients' QOL explained 20.4% of the variance of the patients' QOL on the SASS. When the other

Table 4.24

Regression Model for Patients' Perceptions of Quality of Life on the SASS Including Nurses' Perceptions as an Independent Variable

Variable	b	standard error	standardized b
Nurses' perceptions on SASS	.328***	.089	.264
Morbidity	-.070	.087	-.054
Outlook	.715**	.247	.200
Marital status	.061	.298	.013
Education	-.013	.043	-.019
Sex	1.011***	.280	.218
Length of experience with illness	-.015	.019	-.056
Length of experience with treatment	.002	.004	.043
Functional status (ability to work)	.238	.211	.086
Functional status (ability to perform activities of daily living [ADL])	-.400	.397	-.070
Diagnosis (diabetic/non)	.354	.420	.055
Age	.004	.011	.023
Health status	.745**	.241	.228
Support	.528	.318	.108
Treatment modality	-.604	.309	-.137
Constant	1.696	1.217	

$R^2 = .477$	ANOVA	df	SS	MS
	Regression	15	382.737	25.516
	Residual	149	419.566	2.816

F = 9.061 sig = .000

*$p < .05$
**$p < .01$
***$p < .001$

independent variables were entered into the equation, the model explained 46.5% of the variance. Physicians' perceptions of QOL remained a significant predictor of patients' perceptions of QOL. A one unit increase in the physicians' ratings of the patients' QOL resulted in a .336 unit increase in the predicted value of patients' ratings on the SASS, when other variables were controlled. Other significant predictors included outlook, sex, treatment modality, and health status (see Table 4.25). The patterns of relationships of these variables were again very similar to those described previously.

For the IWB, nurses' perceptions explained 13.7% of the variance of patients' perceptions when only this one independent variable was entered. When the other independent variables were entered after the nurses' perceptions, the entire model explained 52.2% of the variance of patients' perceptions of QOL on the IWB. A one unit increase in the nurses' perceptions resulted in a .154 unit increase in predicted value of patients' reports of QOL on the IWB. Other significant variables included: outlook, treatment modality, support, and functional status (see Table 4.26).

Physicians' perceptions explained 19.5% of the variance of patients' perceptions of QOL on the IWB. When other variables were controlled however, the effect of physicians' perceptions was no longer significant (see Table 4.27). Rather, outlook, support, and treatment modality were significant predictors. The total equation explained 49.6% of the variance of patients' perceptions.

Table 4.25

Regression Model for Patients' Perceptions of Quality of Life on the SASS Including Physicians' Perceptions as an Independent Variable

Variable	b	standard error	standardized b
Physicians' perceptions on SASS	.336**	.114	.239
Morbidity	-.134	.109	-.092
Outlook	.668*	.269	.195
Marital status	.000	.318	.000
Education	-.020	.047	-.030
Sex	.894**	.298	.200
Length of experience with illness	-.026	.019	-.099
Length of experience with treatment	.002	.004	.030
Functional status (ability to work)	.155	.222	.059
Functional status (ability to perform ADL)	-.428	.411	-.081
Diagnosis (diabetic/non)	.655	.429	.109
Age	.000	.012	-.002
Health status	.935***	.256	.292
Support	.258	.314	.058
Treatment modality	-.675*	.331	-.157
Constant	2.314	1.369	

R^2 = .465	ANOVA	df	SS	MS
	Regression	15	302.602	20.173
	Residual	126	348.138	2.763

F = 7.301 sig = .000

*p < .05
**p < .01
***p < .001

Table 4.26

Regression Model for Patients' Perceptions of Quality of Life on the IWB Including Nurses' Perceptions as an Independent Variable

Variable	b	standard error	standardized b
Nurses' perceptions on IWB	.154*	.065	.168
Morbidity	-.121	.118	-.068
Outlook	1.316***	.343	.272
Marital status	.320	.408	.052
Education	-.000	.057	-.000
Sex	-.243	.371	-.039
Length of experience with illness	.003	.025	.009
Length of experience with treatment	-.004	.005	-.048
Functional status (ability to work)	.797**	.276	.213
Functional status (ability to perform ADL)	-.057	.535	-.007
Diagnosis (diabetic/non)	.174	.562	.020
Age	.015	.015	.068
Health status	.402	.326	.091
Support	1.394**	.424	.215
Treatment modality	-.983*	.407	-.165
Constant	2.261	1.554	

R^2 = .522	ANOVA	df	SS	MS
	Regression	15	721.456	48.097
	Residual	140	661.721	4.726

F = 10.176 sig = .000

*p < .05
**p < .01
***p < .001

Table 4.27

Regression Model for Patients' Perceptions of Quality of Life on the IWB Including Physicians' Perceptions as an Independent Variable

Variable	b	standard error	standardized b
Physicians' perceptions on IWB	.150	.095	.127
Morbidity	-.152	.146	-.078
Outlook	1.521***	.352	.334
Marital status	.359	.425	.060
Education	.034	.061	.039
Sex	.022	.395	.004
Length of experience with illness	.001	.026	.004
Length of experience with treatment	.002	.005	.022
Functional status (ability to work)	.470	.291	.134
Functional status (ability to perform ADL)	-.081	.544	-.011
Diagnosis (diabetic/non)	.023	.560	.002
Age	.009	.016	.046
Health status	.530	.345	.123
Support	.952*	.413	.164
Treatment modality	-1.124*	.444	-.196
Constant	2.633	1.644	

R^2 - .496	ANOVA	df	SS	MS
	Regression	15	553.619	36.908
	Residual	120	561.826	4.682

F - 7.883 sig - .000

*p < .05
**p < .01
***p < .001

The nurses' perceptions of patients' QOL explained 2.4% of the variance of patients' perceptions on the TTO. When other variables were controlled, nurses' perceptions were not significant predictors of patients' perceptions of QOL. The significant predictors included: morbidity, marital status, treatment modality, outlook, and functional status (ability to perform activities of daily living [ADL]) (see Table 4.28). Although the indicator of functional status (second measure) was statistically significant (p=.03), it seems likely that this finding occurred by chance. It is not logical to think that people with lower functional status have a higher QOL.

The physicians' perceptions explained 4.5% of the variance of patients' perceptions of QOL on the TTO. Again, when other variables were added to the equation, the effect of physicians' perceptions disappeared. The significant predictors in this model included: morbidity, outlook, marital status, treatment modality and age (see Table 4.29). The total model explained 38% of the variance of patients' perceptions on the TTO.

Explanation of Nurses' Perceptions of Quality of Life

In order to explain the nurses' perceptions of their patients' quality of life, another series of regression equations were examined. In order to examine the interrelationships between the dependent and independent variables, a correlation matrix was generated (see Table 4.30). There was no evidence of multicolinearity among the variables. Scatter diagrams were examined for linearity. There was no evidence of curvilinear relationships between the variables.

Table 4.28

Regression Model for Patients' Perceptions of Quality of Life on TTO Including Nurses' Perceptions as an Independent Variable

Variable	b	standard error	standardized b
Nurses' perceptions on TTO	.080	.070	.086
Morbidity	-.031*	.015	-.148
Outlook	.131**	.044	.233
Marital status	.158**	.053	.219
Education	-.005	.008	-.044
Sex	.031	.051	.043
Length of experience with illness	-.004	.003	-.100
Length of experience with treatment	.000	.000	.095
Functional status (ability to work)	.056	.037	.127
Functional status (ability to perform ADL)	-.153*	.070	-.169
Diagnosis (diabetic/non)	-.144	.077	-.137
Age	.003	.002	.100
Health status	.030	.042	.059
Support	-.085	.056	-.144
Treatment modality	-.224***	.053	-.319
Constant	.749	.202	

$R^2 = .374$

ANOVA	df	SS	MS
Regression	15	7.173	.478
Residual	141	12.030	.085

F = 5.605 sig = .000

*p < .05
**p < .01
***p < .001

Table 4.29

Regression Model for Patients' Perceptions of Quality of Life on TTO Including Physicians' Perceptions as an Independent Variable

Variable	b	standard error	standardized b
Physicians' perceptions on TTO	.111	.130	.078
Morbidity	-.046*	.020	-.190
Outlook	.135**	.049	.239
Marital status	.120	.060	.163
Education	-.003	.009	-.024
Sex	.036	.058	.048
Length of experience with illness	-.006	.004	-.147
Length of experience with treatment	.001	.000	.116
Functional status (ability to work)	-.127	.077	.144
Functional status (ability to perform ADL)	.042	.041	.094
Diagnosis (diabetic/non)	-.083	.084	-.080
Age	.005	.002	.208
Health status	-.003	.048	-.005
Support	-.048	.058	-.068
Treatment modality	-.201	.062	-.281
Constant	.553	.232	

$R^2 = .380$

ANOVA	df	SS	MS
Regression	15	6.359	.424
Residual	116	10.393	.090

F = 4.732 sig = .000

$*p < .05$
$**p < .01$
$***p < .001$

Table 4.30

Correlation Matrix: Dependent and Independent Variables Related to Nurses' Perceptions of their Quality of Life of ESRD Patients

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Index of Well-Being (nurse)	1.0																
2. Time Trade Off (nurse)	.47	1.0															
3. Self-Anchoring Striving Scale (nurse)	.62	.34	1.0														
4. Nurses' age	.14	.12	.07	1.0													
5. Nurses' experience	-.16	.07	-.01	.72	1.0												
6. Nurses' education	-.46	-.17	-.17	-.29	.19	1.0											
7. Patients' age	.05	.14	-.11	.14	.16	-.06	1.0										
8. Patients' marital status	.20	.04	.07	-.03	-.02	-.02	.22	1.0									
9. Sex	.01	-.12	-.04	.03	.02	-.10	.05	-.04	1.0								
10. Diagnosis	-.00	-.17	-.01	-.06	-.05	-.09	-.06	.00	-.00	1.0							
11. Treatment	-.36	-.08	-.43	-.15	.06	.32	.22	-.03	-.01	.05	1.0						
12. Education	.12	.14	.13	-.10	-.06	-.01	-.22	.09	-.02	.03	-.14	1.0					
13. Length of treatment	.14	.03	.06	.14	.04	-.17	-.03	-.08	.02	-.20	-.15	-.05	1.0				
14. Length of illness	.01	-.04	.03	.04	.11	.04	.01	.02	.06	-.11	-.10	-.16	.37	1.0			
15. Morbidity	-.17	-.10	-.16	-.05	-.02	.21	.06	-.02	-.06	.21	.21	-.08	-.20	-.16	1.0		
16. Nurses' perceptions of patient outlook	.67	.33	.58	-.01	-.13	-.22	.05	.11	.05	-.03	.21	-.02	.02	-.07	-.07	1.0	

Table 4.30 con't.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
17.Nurses'perceptions of support	.37	.20	.33	.06	-.03	-.14	-.05	.20	.11	-.04	-.19	-.02	-.05	-.11	-.00	.31	1.0			
18.Nurses' perceptions of functional status (#1)	.40	.22	.53	.07	-.11	-.36	-.17	-.03	.05	-.06	-.42	-.01	.04	.03	-.21	.31	.25	1.0		
19.Nurses' perceptions of functional status (#2)	.30	.11	.37	-.09	-.17	-.21	-.21	.07	-.06	-.03	-.23	-.00	.05	.01	-.18	.32	.10	.63	1.0	
20.Nurses' perceptions of health	.55	.24	.61	-.05	-.16	-.27	-.15	.06	.01	-.05	-.37	.09	-.00	-.01	-.14	.61	.25	.46	.41	1.0

It was hypothesized that the nurses' perceptions of their patients' quality of life would be explained by their age, education, length of experience in the occupational role, and confidence in their ratings of the patients' QOL. However, these variables explained less than five percent of the variance of the nurses' reports on the Time Trade Off. However, they explained 28.4% and 19% of the variance of the nurses' reports on the Index of Well-Being and Self-Anchoring Striving Scale respectively. In order to increase the proportion of variance explained, a number of other patient-related independent variables were added to the regression equations. With the addition of these variables, a significantly greater proportion of variance in QOL was explained. In addition, several other cross-product terms were added to the equations (i.e., nurse's age x patient's age, patient's age x nurse's perceptions of functional status, patient's age x nurse's perceptions of patient's outlook, and patient's age x patient's outlook). However, these interaction terms were not significant.

The regression model explaining nurses' perceptions of their patients' QOL on the Self-Anchoring Striving Scale is shown in Table 4.31. The complete model, including the independent and interactive variables explained 66.1% of the variance of the nurses' perceptions of QOL. The reduced model explained 58.4% of the variance on the SASS. The significant predictors of QOL on this measure included the patients' education, the nurses' education, and the nurses' perceptions of patients' functional status, health status, outlook, and confidence in ratings. A one unit increase in the nurses'

Table 4.31

Regression Model for Nurses' Perceptions of Quality of Life on Self-Anchoring Striving Scale

Variable	b	standard error	standardized b
Patients' education	.064*	.025	.129
Nurses' education	.059**	.025	.118
Nurses' confidence in rating	.387**	.124	.165
Treatment	-.706***	.188	-.221
Nurses' perception of patients' outlook	1.096***	.192	.357
Nurses' perception of patients' functional status (ability to work)	.598***	.138	.256
Nurses' perceptions of patients' health	.465**	.180	.170
Constant	-4.096	1.810	

R^2 = .584	ANOVA	df	SS	MS
	Regression	7	261.014	37.288
	Residual	168	185.872	1.106

F = 33.70 p = .0000

*p < .05
**p < .01
***p < .001

perceptions of the patients' outlook resulted in a 1.09 unit increase in the predicted value of the nurses' rating of QOL on the SASS. A one unit increase in the nurses' confidence in her rating resulted in a .387 unit increase in the predicted value of the nurses' rating. Similarly, increases in the nurses' perceptions of health and functional status also would increase the nurses' ratings of QOL. Increases in either nurses' or patients' education would increase the nurses' ratings of QOL slightly on the SASS.

The complete model used to explain the nurses' perceptions of QOL on the Index of Well-Being explained 66.2% of the variance of QOL. The reduced model, incorporating only significant predictors, explained 47% of the variance. This equation is shown in Table 4.32. Again, nurses' perceptions of patients' outlook was the strongest predictor of nurses' perceptions of QOL; a one unit increase on this variable would result in a 4.1 unit increase on the nurses' rating on the IWB. An increase in patients' education would result in a higher rating by the nurse on the IWB. Again there was an interaction between patient age and outlook, but in the opposite direction. That is, in older persons there was a greater impact of positive outlook on the nurses' perceptions of their quality of life.

The complete regression equation used to explain the nurses' perceptions on the Time Trade Off explained only 33% of the variance. The reduced model (shown in Table 4.33) explained 22.8% of the variance. Again, the nurses' perceptions of the patients' outlook was a major predictor of the nurses' ratings on the TTO; a one unit

Table 4.32

Regression Model for Nurses' Perceptions of Quality of Life on Index of Well-Being

Variable	b	standard error	standardized b
Patients' education	.147**	.058	.139
Nurses' perception of patients' outlook	4.110***	.344	.654
Patients' outlook x age	.009*	.005	.105
Constant	.936	.921	

R^2 = .470	ANOVA	df	SS	MS
	Regression	3	949.765	316.588
	Residual	179	1057.233	5.906

F = 53.602 p = .0000

*p < .05
**p < .01
***p < .001

Table 4.33

Regression Model for Nurses' Perceptions of Quality of Life on Time Trade Off

Variable	b	standard error	standardized b
Patients' education	.019**	.007	.199
Patients' age	.005**	.002	.232
Patients' sex	-.085*	.044	-.133
Patient diagnosis	.133*	.060	-.152
Nurses' perception of patients' outlook	.140***	.040	.252
Nurses' perception of patients' functional status (ability to work)	.070**	.031	.165
Constant	-.234	.138	

$R^2 = .228$	ANOVA	df	SS	MS
	Regression	6	3.626	.604
	Residual	166	12.273	.074

F = 8.175 p = .0000

*p < .05
**p < .01
***p < .001

increase in the nurses' perceptions of outlook resulted in a .140 unit increase in the predicted value of the nurses' rating of QOL on the TTO, when patient age, patient sex, patient diagnosis, and nurses' perception of patients' functional status were controlled. A one year increase in patient education or age resulted in a slight increase in the nurses' ratings of QOL on the TTO. Male patients tended to be rated by the nurses as having a slightly lower QOL on the TTO, even when the other variables were controlled. Non-diabetics had a .133 unit higher predicted value on the nurses rating of their QOL.

Nurses' Perceptions Including Patients' Perceptions as an Independent Variable

Another series of regression analyses were conducted to examine whether the patients' perceptions of their QOL were significant predictors of the nurses' perceptions of the patients' QOL. It is possible that the patients' perceptions of their QOL may influence the perceptions of their care providers. The nurses' perceptions of the patients' QOL were used as the dependent variable and the following variables were entered after the patients' perceptions as independent variables: patient age, sex, marital status, education, treatment modality, diagnosis, length of time receiving treatment, length of experience with illness and morbidity; nurses' age, education, length of experience, and confidence in their rating; and nurses' perceptions of patients' health status, functional status, outlook and support. Interaction terms are not reported because the possible interactions were not considered to be significant, either statistically or clinically. The complete (rather than reduced) equations are reported so that the effect of the patients' perceptions can be seen, regardless of whether or not this variable is statistically significant.

With the equation using the nurses' perceptions of the patients' QOL on the SASS as the dependent variable, the patients' ratings on the SASS explained 22.4% of the variance. When other independent variables were entered into the equation, 64% of the variance was explained. The patients' perceptions remained significant predictors of QOL even with other variables controlled. The other significant predictors of nurses' perceptions of QOL were very similar to those described previously. That is, patients' education, nurses' education, nurses' confidence in their ratings, treatment modality, and nurses' perceptions of patients' functional status and outlook were significant predictors of nurses' perceptions of patients' QOL on the SASS (see Table 4.34).

When the patients' perceptions of QOL on the IWB were entered into a regression equation with the nurses' perceptions on the IWB as the dependent variable, 13.7% of the variance was explained. However, when other independent variables were entered into the equation after the patients' perceptions, the effect of the patients' perceptions disappeared. That is, patients' perceptions on the IWB were not significant predictors of nurses' perceptions on the IWB when other variables were controlled. The total equation including other predictor variables explained 65.3% of the variance. Again, the pattern of predictors of nurses' perceptions was very similar to

Table 4.34

Regression Model for Nurses' Perceptions of QOL on SASS Using Patients' Perceptions as an Independent Variable

Variable	b	standard error	standardized b
Patients' perceptions on SASS	.148***	.049	.205
Nurses' age	.018	.026	.077
Nurses' education	.478**	.164	.241
Nurses' experience	-.018	.027	-.071
Age	.003	.008	.028
Education	.067*	.027	.137
Sex	-.021	.197	-.006
Marital status	-.209	.200	-.063
Diagnosis	-.060	.252	-.014
Morbidity	-.010	.059	-.010
Treatment modality	-.657**	.221	-.205
Length of experience with illness	.005	.012	.025
Length of experience with treatment	.001	.003	.025
Nurses' perceptions of outlook	1.085***	.211	.354
Nurses' perceptions of support	.157	.203	.047
Nurses' perceptions of health	.285	.195	.104
Nurses' perceptions of functional status (ability to work)	.563**	.178	.244
Nurses' perceptions of functional status (ability to perform ADL)	-.053	.321	-.012
Nurses' confidence in rating	.298*	.145	.126
Constant			

R^2 = .645	ANOVA	df	SS	MS
	Regression	19	246.576	12.978
	Residual	129	135.961	1.054

F = 12.31 sig = .000

*$p < .05$
**$p < .01$
***$p < .001$

that described previously; patients' education, and nurses' perceptions of patient outlook and support were predictors of nurses' perceptions of QOL on the IWB (see Table 4.35).

On the TTO, patients' perceptions explained 3.6% of nurses' perceptions when this variable was entered alone into the equation. However, when other variables were controlled, patients' perceptions on the TTO lost significance. The total equation explained 27.7% of the variance. Significant predictors included patient age, sex, education, and nurses' perceptions of patients' functional status and outlook. Again, this equation is very similar to that described previously for nurses' perceptions of patients' QOL on the TTO (see Table 4.36).

Explanation of Physicians' Perceptions of Quality of Life

Another series of regression equations were used to examine the physicians' perceptions of QOL. The zero-order correlation matrix of dependent and independent variables used in the equations is shown in Table 4.37. From this matrix, it is evident that there was colinearity between two variables: physicians' experience and physicians' age ($r=.91$). Hence, physicians' age was not included as an independent variable.

Scatter diagrams between the dependent and independent variables were examined. There was no evidence of curvilinear relationships between variables.

It had been hypothesized that the physicians' perceptions of their patients' QOL would be explained by their age, education,

Table 4.35

Regression Model for Nurses' Perceptions of QOL on IWB Including Patients' Perceptions as an Independent Variable

Variable	b	standard error	standardized b
Patients' perceptions on IWB	.103	.074	.097
Nurses' age	.067	.055	.143
Nurses' education	-.527	.350	-.133
Nurses' experience	-.088	.061	-.167
Age	.018	.016	.074
Education	.163**	.056	.164
Sex	-.250	.395	-.036
Marital status	.406	.422	.060
Diagnosis	.527	.518	.058
Morbidity	-.089	.127	-.045
Treatment modality	-.383	.449	-.059
Length of experience with illness	-.011	.025	-.027
Length of experience with treatment	.006	.005	.076
Nurses' perceptions of outlook	2.589***	.444	.414
Nurses' perceptions of support	.873*	.420	.131
Nurses' perceptions of health	.797	.404	.141
Nurses' perceptions of functional status (ability to work)	.029	.378	.006
Nurses' perceptions of functional status (ability to perform ADL)	.541	.664	.060
Nurses' confidence in rating	.086	.318	.018
Constant	3.988	6.983	

$R^2 = .653$	ANOVA	df	SS	MS
	Regression	19	991.015	52.159
	Residual	123	525.543	4.273

F = 12.207 sig = .000

*p < .05
**p < .01
***p < .001

Table 4.36

Regression Model for Nurses' Perceptions of QOL on TTO Including Patients' Perceptions as an Independent Variable

Variable	b	standard error	standardized b
Patients' perceptions on TTO	.012	.095	.013
Nurses' age	-.003	.007	-.079
Nurses' education	-.015	.046	-.046
Nurses' experience	.009	.008	.193
Age	.006**	.002	.266
Education	.018*	.008	.191
Sex	-.122*	.055	-.193
Marital status	-.070	.057	-.112
Diagnosis	-.050	.073	-.059
Morbidity	-.011	.016	-.061
Treatment modality	.008	.062	.014
Length of experience with illness	-.002	.003	-.051
Length of experience with treatment	.000	.000	.118
Nurses' perceptions of outlook	.111*	.058	.195
Nurses' perceptions of support	.072	.056	.118
Nurses' perceptions of health	.006	.053	.011
Nurses' perceptions of functional status (ability to work)	.098*	.050	.232
Nurses' perceptions of functional status (ability to perform ADL)	-.067	.094	-.079
Nurses' confidence in rating	-.003	.038	-.006
Constant	.035	.930	

$R^2 = .277$	ANOVA	df	SS	MS
	Regression	19	3.486	.183
	Residual	119	9.113	.077

F = 2.396 sig = .002

*p < .05
**p < .01
***p < .001

Table 4.37

Correlation Matrix: Dependent and Independent Variables Related to Physicians' Perceptions of their Quality of Life of ESRD Patients

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1.Index of Well-Being (doctor)	1.0																			
2.Time Trade Off (doctor)	.58	1.0																		
3.Self-Anchoring Striving Scale (doctor)	.75	.59	1.0																	
4.Doctors' age	.12	.20	.08	1.0																
5.Doctors' experience	-.02	.17	-.01	.91	1.0															
6.Doctors' education	.13	.02	.07	.57	.23	1.0														
7.Patients' age	-.00	-.14	-.05	-.05	-.02	-.07	1.0													
8.Patients' marital status	.15	.10	.08	.16	.06	.12	.22	1.0												
9.Sex	.06	-.07	-.01	.12	.12	.08	.05	-.04	1.0											
10.Diagnosis	-.01	-.15	-.09	-.05	-.05	.01	-.06	.00	-.00	1.0										
11.Treatment	-.42	-.38	-.43	-.04	.14	-.24	.22	-.03	-.01	.05	1.0									
12.Education	.11	.05	-.01	.00	-.06	.11	-.22	.09	-.02	.03	-.14	1.0								
13.Length of treatment	.05	.09	.13	.13	.24	.21	-.03	-.08	.02	-.20	-.15	-.05	1.0							
14.Length of illness	.05	.16	.10	.16	.17	.00	.01	.02	.06	-.11	-.10	-.16	.37	1.0						
15.Morbidity	-.16	-.18	-.23	-.20	-.15	-.12	.06	-.02	-.06	.21	.21	-.08	-.20	-.16	1.0					
16.Doctors' perceptions of patient outlook	.59	.43	.54	-.05	-.12	.11	-.01	-.02	.12	.12	-.32	-.06	-.02	.08	-.03	1.0				

Table 4.37 con't

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
17.Doctors'perceptions of support	.52	.29	.33	.09	.03	.04	.12	.28	.10	.02	-.02	.11	-.04	-.01	-.08	.33	1.0			
18.Doctors' perceptions of functional status (ability to work)	.40	.22	.53	.07	-.11	-.36	-.17	-.03	.05	-.06	-.42	.04	.04	.15	-.22	.45	.28	1.0		
19.Doctors' perceptions of functional status (ability to perform ADL)	.30	.11	.37	-.09	-.17	-.21	-.21	.07	-.06	.03	-.23	.01	-.03	.08	-.05	.44	.18	.66	1.0	
20.Doctors' perceptions of health	.55	.24	.61	-.05	-.16	-.27	-.15	.06	.01	-.05	-.37	.13	.05	.08	-.09	.59	.29	.66	.54	1.0

length of experience in the occupational role and confidence in their ratings of the patients' QOL. A limited proportion of variance (from 13.3% to 13.9%) on the various measures of QOL was explained by the physicians' characteristics and confidence of their ratings. It was decided that a number of patient-related variables might help to explain a greater proportion of the variance of the physicians' perceptions of QOL. Hence, another model was generated in which physicians' perceptions of their patients' QOL were regressed against physicians' characteristics, patients' characteristics, and physicians' perceptions of patients' support, health status, functional status, and outlook. As well, several interaction terms (i.e., patient age x physician age, age of patient x physicians' perceptions of functional status, age of patient x patients' perceptions of functional status, age of patient x physicians' perception of patients' outlook, and age of patient x patients' outlook) were entered into the equations.

The regression equation including the physicians' characteristics, patients' characteristics, patient-related variables, and the interaction terms explained 56.4% of the variance of quality of life on the Self-Anchoring Striving Scale. The reduced equation, including only the significant predictors, is shown in Table 4.38. It explained 44.8% of the variance on the SASS. Physicians' perceptions of patients' functional status and health status were the only two significant predictors. Increases in ratings on either variable resulted in predicted increases in QOL scores on the SASS.

Table 4.38

Regression Model for Physicians' Perceptions of Quality of Life on Self-Anchoring Striving Scale

Variable	b	standard error	standardized b
Physicians' perceptions of patients' functional status (ability to work)	.707***	.160	.339
Physicians' perceptions of patients' health	.937***	.182	.395
Constant	4.412	.230	

$R^2 = .448$	ANOVA	df	SS	MS
	Regression	2	167.732	83.866
	Residual	167	206.362	1.236

F = 67.869 sig = .0000

***p < .001

7

When the independent and interactive variables were included in the regression equation explaining physicians' ratings of QOL on the IWB, 65.7% of the variance was explained. A reduced model, incorporating only significant predictors is shown in Table 4.39. This equation explained 45% of the variance of the QOL on the IWB. Physicians' perceptions of patients' support and physicians' perceptions of patients' outlook were the only two significant predictors. An increase in either of these indicators was associated with a higher rating of QOL on the IWB by the physician, when the other variable was controlled.

The complete equation explaining physicians' perceptions of QOL on the Time Trade Off Measure explained 60.5% of the variance. The reduced equation (shown in Table 4.40) incorporating only statistically significant predictors explained 31.5% of the variance on the TTO.[1] Patients' sex, treatment, physicians' education, length of experience in the occupational role, and perceptions of patients' support were significant predictors of physicians' perceptions on the TTO. The physicians that were more experienced and better educated rated their patients' QOL somewhat lower on the TTO than did their colleagues, even when other variables were controlled. Also, they

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[1] Because of concern regarding the loss of explained variance from the complete to the reduced equation, a forward regression procedure was also used. Two additional independent variables achieved significance using a .05 tolerance level. These variables were the physicians' perceptions of outlook and the physicians' perceptions of functional status (i.e., ability to work). With the addition of these two predictor variables to the equation, 49.2% of the variance of physicians' perceptions of quality of life was explained.

Table 4.39

Regression Model for Physicians' Perceptions of Quality of Life on Index of Well-Being

Variable	b	standard error	standardized b
Physicians' perceptions of patients' support	2.022***	.363	.347
Physicians' perceptions of patients' outlook	2.141***	.288	.463
Constant	2.948	.668	

$R^2 = .451$	ANOVA	df	SS	MS
	Regression	2	457.258	228.629
	Residual	163	556.987	3.417

F = 66.907 sig = .0000

***$p < .001$

Table 4.40

Regression Model for Physicians' Perceptions of Quality of Life on Time Trade Off

Variable	b	standard error	standardized b
Treatment	-.213***	.032	-.454
Patients' sex	-.068*	.033	-.137
Physicians' education	-.084**	.038	-.154
Physicians' experience in occupational role	.008***	.002	.279
Physicians' perceptions of patients' support	.156***	.035	.297
Constant	2.270	.883	

$R^2 = .315$	ANOVA	df	SS	MS
	Regression	5	2.874	.575
	Residual	160	6.230	.039

F = 11.471 p = .0000

*p < .05
**p < .01
***p < .001

rated dialysis patients .211 units lower on the TTO than transplant patients, even when other predictors were controlled. Higher ratings by the physicians of patients' support resulted in higher ratings in predicted values of QOL on the TTO when other predictors were controlled.

Physicians' Perceptions Including Patients' Perceptions as an Independent Variable

Another series of regression analyses were conducted to examine whether the patients' perceptions of their QOL were significant predictors of their physicians' perceptions. The patients' perceptions of QOL were entered as independent variables with patients' age, sex, marital status, education, treatment modality, diagnosis, length of time receiving treatment, length of experience with illness, morbidity, physicians' education, length of experience and confidence in their ratings; and physicians' perceptions of patients' health status, functional status, support, and outlook. Again, the complete (rather than reduced) equations are reported so that the size of the regression coefficient of the patients' perceptions can be seen, regardless of whether this variable is statistically significant.

On the SASS, patients' perceptions of their QOL on the measure explained 20.4% of the variance of the physicians' perceptions. When the other independent variables were added to the equation, 58.6% of the variance was explained. Significant predictors included the physicians' perceptions of patients' health status, functional status, and outlook. Also, the patients' perceptions of their QOL on the SASS were significant predictors of the physicians' perceptions of QOL (see Table 4.41).

For the IWB, patients' perceptions alone explained 19.5% of the variance of the physicians' perceptions. This variable was not significant when other variables were controlled. The total equation explained 60% of the variance of physicians' perceptions of QOL on the IWB (see Table 4.42). Similar to the previously reported equations explaining physicians' perceptions, the significant predictors were: treatment modality, physicians' perceptions of patient support, outlook, and functional status.

When the patients' perceptions of their QOL on the TTO were entered as an independent variable into the equation explaining physicians' perceptions of QOL, 6.6% of the variance was explained. By adding other independent variables, 52.5% of the variance of the physicians' perceptions of QOL was explained. Again, patients' perceptions were not significant when other variables were controlled. The following variables were significant predictors of physicians' perceptions: treatment modality, physicians' experience in role, physicians' education, and physicians' perceptions of patient outlook and support (see Table 4.43).

Explanation of Differences Between Groups

The last research question in this study pertained to explaining the differences in perceptions between nurses and patients, physicians and patients, and physicians and nurses. There is

Table 4.41

Regression Model for Physicians' Perceptions of QOL on SASS Using Patients' Perceptions as an Independent Variable

Variable	b	standard error	standardized b
Patients' perceptions on SASS	.126*	.055	.171
Physicians' education	-.249	.260	-.067
Physicians' experience	.018	.014	.102
Age	-.004	.008	-.032
Education	-.055	.032	-.117
Sex	-.382	.218	-.118
Marital status	.231	.222	.072
Diagnosis	-.499	.288	-.118
Morbidity	-.029	.080	-.026
Treatment modality	-.270	.254	-.086
Length of experience with illness	-.015	.014	-.084
Length of experience with treatment	.003	.003	.065
Physicians' perceptions of outlook	.517*	.254	.169
Physicians' perceptions of support	.362	.241	.107
Physicians' perceptions of health	.654*	.254	.257
Physicians' perceptions of functional status (ability to work)	.596*	.238	.268
Physicians' perceptions of functional status (ability to perform ADL)	-.315	.329	-.090
Physicians' confidence in rating	.279	.152	.142
Constant			

$R^2 = .586$

ANOVA	df	SS	MS
Regression	18	183.584	10.199
Residual	111	129.924	1.170

F = 8.714 sig = .000

Table 4.42

Regression Model for Physicians' Perceptions of QOL on IWB Using Patients' Perceptions as an Independent Variable

Variable	b	standard error	standardized b
Patients' perceptions on IWB	.101	.063	.122
Physicians' age	-.215	.405	-.038
Physicians' education	.007	.051	.009
Physicians' experience	.032	.023	.113
Age	.012	.013	.069
Education	.007	.051	.009
Sex	-.282	.346	-.055
Marital status	.339	.359	.067
Diagnosis	-.191	.454	-.029
Morbidity	-.031	.128	-.018
Treatment modality	-.948*	.410	-.194
Length of experience with illness	-.028	.022	-.096
Length of experience with treatment	-.002	.005	.037
Physicians' perceptions of outlook	1.309**	.409	.264
Physicians' perceptions of support	1.712***	.451	.281
Physicians' perceptions of health	.202	.405	.050
Physicians' perceptions of functional status (ability to work)	.813*	.374	.227
Physicians' perceptions of functional status (ability to perform ADL)	-.327	.552	-.056
Physicians' confidence in rating	.423	.267	.141
Constant			

R^2 - .598	ANOVA	df	SS	MS
	Regression	18	445.898	24.772
	Residual	106	298.717	2.818

F - 8.790 sig - .000

Table 4.43

Regression Model for Physicians' Perceptions of QOL on TTO Using Patients' Perceptions as an Independent Variable

Variable	b	standard error	standardized b
Patients' perceptions on TTO	.009	.064	.013
Physicians' education	-.087*	.042	-.162
Physicians' experience	.008***	.002	.324
Age	-.000	.001	-.023
Education	-.001	.005	-.018
Sex	-.094*	.038	-.193
Marital status	.016	.038	.034
Diagnosis	-.095	.050	-.145
Morbidity	-.008	.014	-.048
Treatment modality	-.147***	.043	-.314
Length of experience with illness	.002	.002	.059
Length of experience with treatment	-.000	.000	-.046
Physicians' perceptions of outlook	.101*	.045	.214
Physicians' perceptions of support	.104*	.044	.194
Physicians' perceptions of health	.044	.044	.113
Physicians' perceptions of functional status (ability to work)	.051	.040	.149
Physicians' perceptions of functional status (ability to perform ADL)	-.029	.057	-.053
Physicians' confidence in rating	-.002	.026	-.007
Constant	2.178	.954	

R^2 = .525	ANOVA	df	SS	MS
	Regression	18	3.404	.189
	Residual	101	3.083	.031

F = 6.196 sig = .000

considerable confusion in the literature regarding the most appropriate statistical analysis for designs that involve explanation of differences between groups (or similarly changes over time). Three possible options were selected for discussion including: difference scores (where absolute differences in scores between groups are used as the dependent variable), the regressor variable method (where one group's scores on a measure are regressed on the other group's scores along with other independent variables), and residualized variables (where differences are operationalized as residuals). Each of these methods is discussed and a summary of findings using each method is presented.

The difference score is calculated by subtracting one individual's rating (e.g., a patient's score) from another individual's rating (e.g., a nurse's score) on the same variable (e.g., patient's Index of Well-Being). The major objection to the use of difference or change scores is that the variables used to create the differences tend to be correlated, and measurement error in the two sets of scores are "transferred" to or duplicated in the difference score. Also, there is concern that if two sets of scores are equally reliable, the difference score will be less reliable (Bohrnstedt, 1969; Cronbach & Furby, 1970). However, more recently, it has been demonstrated that change scores can be very reliable (Allison, 1988; Sharma & Gupta, 1986; Zimmerman & Williams, 1986). Furthermore, the difference score seems to most accurately reflect the concept being operationalized (that is, the discrepancy between the nurse's and patient's perception of the patient's quality of life), and is most likely to be interpretable to a wide audience.

When difference scores were used as dependent variables in an effort to explain differences in perceptions between the groups in this study (i.e., differences between nurses and patients, physicians and patients, and nurses and physicians), several problems arose. The proportion of explained variance in the difference scores ranged from 0% to 31% (see Table 4.44) using the available independent variables. Also, there did not appear to be a consistent pattern of predictors for each set of dependent measures. For instance, when differences between nurses' and physicians' ratings of QOL were used as a dependent variable, no significant predictors were found that explained the differences in the ratings on the Self-Anchoring Striving Scale; treatment modality was the only significant predictor of differences on the Time Trade Off; and nurses' education and nurses' perceptions of patients' outlook were significant predictors of differences on the Index of Well-Being.

The results obtained from this set of analyses are difficult to interpret, given the lack of consistency of the findings. It may be that the magnitude of the differences is not large and that the findings are artifacts of the analysis. That is, if the variances of patients' and health care providers' scores have been explained, then the differences have also been explained. Any remaining variance of unexplained differences could be attributed to random error. Alternatively, it is possible that the independent or predictor

Table 4.44

Summary Table Identifying Significant Predictors of Differences Between Groups Using Difference Score as Dependent Variable

Instrument	Difference Between Patient & Nurse	Difference Between Patient & Physician	Difference Between Nurse & Physician
SASS	Patients' perceptions of outlook Patients' sex Nurses' perception of patients' outlook R^2 = .131	Patients' perception of health Patients' sex R^2 = .115	None R^2 = .0
IWB	Patients' perceptions of outlook Patients' perception of functional status (ability to perform ADL) R^2 = .20	Physicians' perceptions of patient's support R^2 = .076	Nurses' education Nurses' perceptions of patients' outlook R^2 = .313
TTO	Patients' perceptions of health status R^2 = .076	Patient age R^2 = .086	Treatment modality R^2 = .074

variables included in the analysis are less appropriate for explaining differences between groups than for explaining the perceptions of each group.

The regressor variable method is preferred by some sociologists (Bohrnstedt, 1969) because measurement error is accounted for. Using this method, one group's scores are regressed on another group's scores along with a series of independent variables. For instance, nurses' perceptions of QOL could be regressed on patients' perceptions of QOL. The remaining variance is related to differences in perceptions between nurses and patients and could be explained by such variables as sociodemographic characteristics of nurses and medical and sociodemographic characteristics of patients.

The findings from such analyses were reported earlier in Tables 4.34 to 4.36 and 4.41 to 4.43 in relation to the effects of one group's perceptions on another's. It was possible to explain a greater proportion of the variance of the dependent variable than was possible using the difference score. It was interesting to note that the patterns of predictors did not change significantly regardless of whether another group's perceptions (on the dependent variable in question) were entered as independent variables. For instance, including patients' perceptions of QOL as a predictor of nurses' or physicians' QOL did not substantially change the findings of the regression equation.

However, one would expect that one set of variables would explain perceptions of each group; on the other hand, one would expect that another set of variables would explain differences in perceptions between the groups. Hence, it seems that the regressor variable method does not produce the hypothesized results. This observation has been made by other researchers (e.g., Allison, 1988) and has come to be known as Lord's paradox. Allison (1988) suggests that the problem occurs because the regression model does not provide enough adjustment for prior differences.

In the last method examined, differences in perceptions between groups were operationalized as the residuals of the regression equation where one group's perceptions were regressed on another group's perceptions. The residuals from this equation were used to create the dependent variable.

The findings from these analyses are summarized in Table 4.45. Using this procedure, 35.5 to 58.4% of the variance of the various dependent measures were explained. Consistent patterns of predictors were found. For instance, residuals of the regression of the nurses' perceptions of QOL on the patients' perceptions were explained by the patients' outlook (on all three dependent measures), by the patients' perceptions of functional status (on two of the dependent measures), and by sex of the patient, patients' perceptions of support, and patients' perceptions of health status (on one of the dependent measures).

While this methodology appears to offer some predictive ability and consistency in the pattern of predictors, it too, has considerable error variance. The residuals are calculated by subtracting the predicted score ($\hat{Y}$) from the actual score (Y).

Table 4.45

Summary Table Identifying Significant Predictors of the Residualized Dependent Variables

Instru- of	Residuals of Nurses' Perceptions on Patients' Perceptions	Residuals of Physicians' Perceptions on Patients' Perceptions	Residuals of Nurses' Perceptions on Physicians' Perceptions
SASS	Sex Patients' perceptions of health Patients' outlook Patients' functional status (ability to perform ADL) $R^2 = .435$	Patients' outlook Patient's health $R^2 = .355$	Nurses' education Nurses' perceptions of patients' outlook $R^2 = .463$
IWB	Patients' perceptions of support Patients' outlook Patients' perceptions of functional status $R^2 = .504$	Patients' outlook $R^2 = .369$	Nurses' education Nurses' perceptions of patients' outlook Education of nurse x education of physician $R^2 = .584$
TTO	Patients' outlook $R^2 = .407$	Patients' outlook Physicians' confidence in rating Age of patient $R^2 = .377$	Treatment modality Nurses' education $R^2 = .317$

Although the predictions are generated in the regression equation where one group's scores are predicted from the other group's scores, the results of $Y-\hat{Y}$ are not the same as Y-X. That is, the residual is the discrepancy between the patient's predicted score and the patient's actual score, while the difference score is the discrepancy between the patient's score and the nurse's score (i.e., the nurse's assessment of the patient's QOL).

In summary, it appears that each of the methods used to explain differences between groups has some limitations. The use of difference scores was preferred by this investigator because the operationalization reflected the concept under consideration most closely. However, the potential for measurement error was noted. Further, the findings were rather difficult to interpret because of the lack of consistency in the pattern of predictors.

Summary

The findings of the study were presented in the order of the research questions. The first question pertained to the reliability and validity of the measures of quality of life. Test-retest reliability of the measures was checked on a subset (n=20) of the total sample. The correlations for patients ranged from .42 on the Index of Well-Being to .85 on the Time Trade Off. Nurses' and physicians' responses were more stable on the Index of Well-Being with correlations of .86 and .85 respectively. The consistency reliability of the Index of Well-Being was relatively high (alpha of

.91). Again, the care providers' reports on this measure had greater internal consistency than the patients' reports.

There was some evidence for concurrent validity of the measures of QOL with correlations from .44 to .65 between the instruments. There was some evidence for discriminant validity, in that transplant patients, as expected, rated their QOL significantly higher than did the dialysis patients.

Mean scores of patients and nurses were compared using Hotelling's t-square and paired t-tests for differences between means. Nurses' rating of patients' QOL were lower than patients' scores on the Time Trade Off and Overall Life Satisfaction measure. The correlations between nurses' and patients' ratings on the various measures ranged from a low of .19 on the Time Trade off to .47 on the Self-Anchoring Striving Scale.

Patients' ratings on the Self-Anchoring Striving Scale were significantly lower than the physicians' ratings. However, on the other measures of QOL, mean scores of patients and physicians did not differ significantly. However the correlations between physicians' and patients' ratings were moderately low, ranging from .26 to .45.

Nurses' perceptions also differed statistically from physicians' ratings on all measures except the Index of General Affect. Overall, nurses' ratings were lower than those of the physicians, even when differences were not statistically significant. Correlations between nurses' and physicians' scores ranged from .35 on the Time Trade Off to .49 on the Index of Well-Being.

Regression equations were used to explain the patients' perceptions of QOL. Using a series of independent variables, approximately 50% of the variance of QOL was explained on each of the dependent measures. The most significant predictors of the patients' perceptions of their QOL were outlook, treatment, and health status.

Another set of regression equations were used to examine the effect of the health care providers' perceptions on the patients' perceptions of their QOL. The physicians' and nurses' perceptions were significant predictors of the patients' perceptions of QOL on the SASS. Nurses' perceptions of QOL were also significant predictors of patients' QOL on the IWB. However, physicians' perceptions were not significant predictors of patients' ratings of QOL when other variables were controlled. Neither physicians' nor nurses' perceptions of QOL were significant predictors of patients' perceptions on the TTO when other variables were controlled.

Another series of regression equations (one for each dependent variable) were examined to explain the nurses' perceptions of the patients' QOL. The variables that were the most significant and consistent predictors of the nurses' perceptions were the patients' education, and the nurses' perceptions of the patients' functional status and outlook. In another set of equations, the patients' perceptions were included as predictors of the nurses' perceptions. When other variables were controlled, the patients' perceptions were significant predictors of the nurses' perceptions of the patients' QOL on the SASS. This variable was not a significant predictor of the other two dependent variables.

The physicians' perceptions of quality of life were examined. Different predictors explained each of the equations; that is, each of the dependent measures of quality of life had different predictors. The physicians' perceptions of support were significant predictors of QOL on two of the measures. The patients' perceptions were found to be significant predictors of the physicians' perceptions on the SASS, when other variables were controlled. This variable was not a significant predictor of the other two dependent variables.

An attempt was made to explain differences in perceptions of patients and nurses, patients and physicians, and nurses and physicians. No consistent pattern of predictors was found.

V. STRUCTURAL EQUATION MODELS

Several models were developed to explain the patients', nurses', and physicians' perceptions of quality of life. The LISREL computer program (contained as a USERPROC in SPSSx) was used to test these models. LISREL is an acronym which refers to the analysis of Linear Structural Relations (Hayduk, 1987; Joreskog & Sorbom, 1987). The LISREL program calculates the strength of effects within a model, estimates of error variances, and a test of the overall fit between a hypothesized model and a data set.

A number of Greek letters are used to designate the structural parameters in LISREL. All dependent variables, which are known as endogenous variables, are represented by the Greek letter, eta. Independent variables are known as exogeneous variables, and are represented by the Greek letter, ksi. Betas represent effects between endogeneous variables and gammas represent the effects of exogenous variables on endogenous variables. Phi represents the covariance between exogeneous concepts. Lambdas are used to designate the links between the concepts (also known as the latent variables) and their indicators (also known as the manifest variables). Psi refers to the unexplained or error variance for prediction of the endogeneous variables. Theta epsilons represent the measurement error variances and covariances for the endogenous variables and theta deltas represent the error variances/covariances for the exogenous variables.

In LISREL, there are several ways of determining whether a model fits the data. A Chi-square statistic is computed. In LISREL, a small Chi-square suggests that the data fits the hypothesized model. As well, full residual matrix is provided. A detailed explanation of LISREL is beyond the scope of this dissertation. Further information regarding structural equation modeling using LISREL can be found in the work of Hayduk (1987), Aaronson, Frey, and Boyd (1988) and Boyd, Frey, and Aaronson (1988).

Model of Patients' Perceptions of Quality of Life

In this section, the model of the patients' perceptions of quality of life is outlined. No central underlying theory guides the model because the previous work on quality of life has largely been atheoretical. Rather, the hypotheses and linkages are theoretically eclectic, using knowledge from sociology, psychology, nursing, and medicine to justify and explain linkages in the model. The description of the model is followed by an overview of the measurement structure of the model. In the following pages, the findings obtained in the analyses of the models using three indicators of QOL, two indicators of QOL, and finally, one indicator of QOL are provided.

Three Indicator Model

The proposed three indicator model is depicted in Figure 5.1. It was hypothesized that quality of life of patients with end stage renal disease is causally linked to the patients' outlook, health

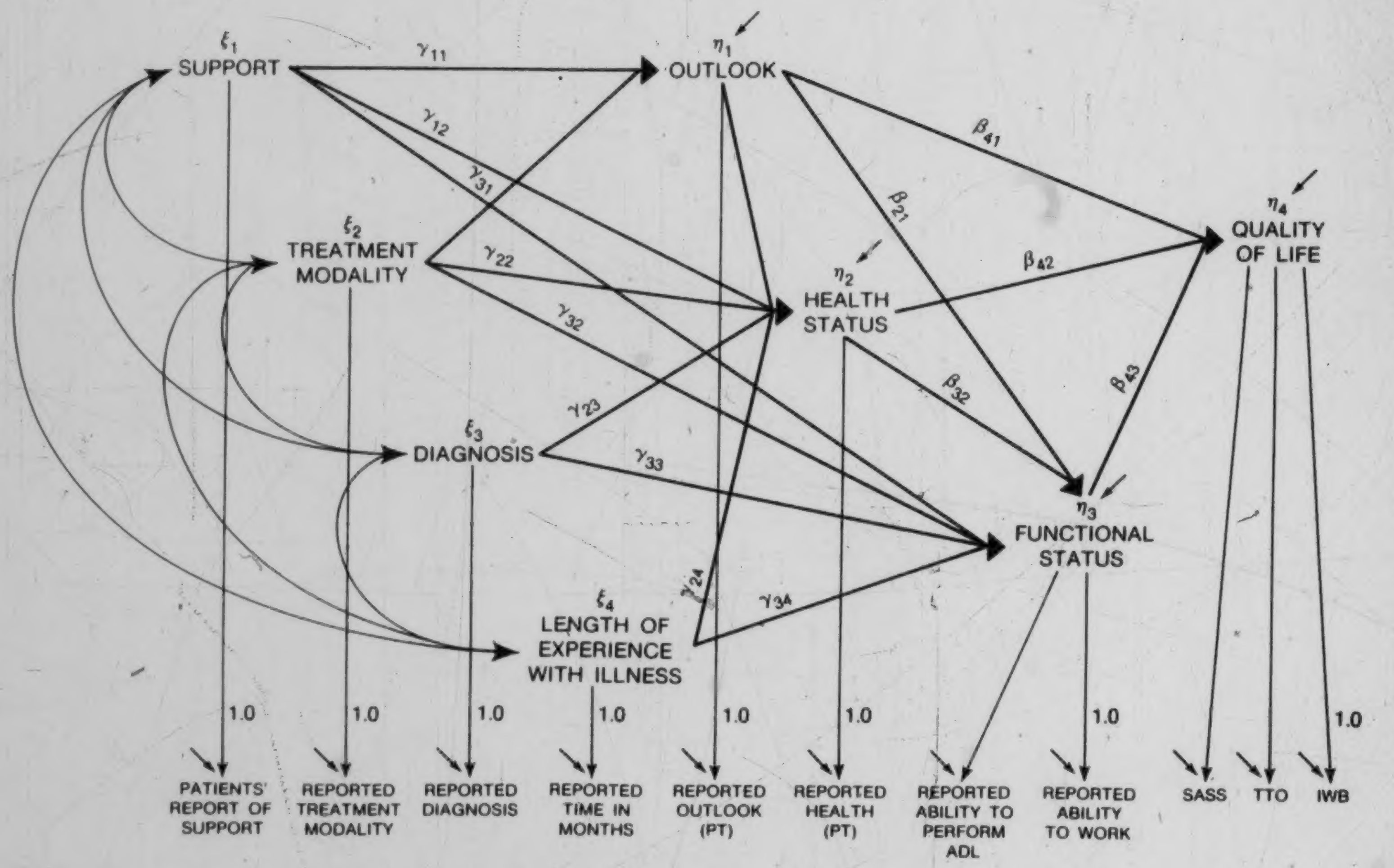

ξ_1 SUPPORT
ξ_2 TREATMENT MODALITY
ξ_3 DIAGNOSIS
ξ_4 LENGTH OF EXPERIENCE WITH ILLNESS
η_1 OUTLOOK
η_2 HEALTH STATUS
η_3 FUNCTIONAL STATUS
η_4 QUALITY OF LIFE
γ_{11}
γ_{12}
γ_{31}
γ_{22}
γ_{32}
γ_{23}
γ_{33}
γ_{24}
γ_{34}
β_{41}
β_{21}
β_{42}
β_{32}
β_{43}
1.0
PATIENTS' REPORT OF SUPPORT
REPORTED TREATMENT MODALITY
REPORTED DIAGNOSIS
REPORTED TIME IN MONTHS
REPORTED OUTLOOK (PT)
REPORTED HEALTH (PT)
REPORTED ABILITY TO PERFORM ADL
REPORTED ABILITY TO WORK
SASS
TTO
IWB

Figure 5.1 Model of Patients' Perceptions of their Quality of Life

status and functional status. People who are optimistic and feel that they have control over their lives have a higher quality of life. Also, people who are healthier and who have a higher functional status have a higher quality of life.

A causal relationship was hypothesized between outlook and health status and between health status and functional status. It is believed that people who have a positive outlook have a higher perceived health status, and that people who are healthier have a higher functional status. It was also hypothesized that support would affect quality of life through its effect on outlook, health, and functional status. People who have significant family and social support are more likely to have a positive outlook, good health and a higher functional status.

Also, treatment modality was thought to affect quality of life, through its effects on outlook, health, and functional status. People who have received renal transplants are more likely to have a positive outlook, better health, and higher functional status than dialysis patients.

Considerable literature has attested to the problems of diabetic patients with end stage renal disease. Hence, it was hypothesized that diabetic patients would be less healthy and have a lower functional status, thereby adversely affecting their quality of life. No link was proposed between diagnosis and outlook, since there is no evidence to suggest that diabetics have any more or less difficulty adjusting to end stage renal disease than do other individuals.

It was also hypothesized that length of experience with the treatment modality would affect an individual's health and functional status. Individuals who have just started dialysis or who have recently been transplanted are less likely to be in an optimal health state. Also, individuals who have little experience with their treatment modality are less likely to be able to assume their previous roles and responsibilities. No relationship was hypothesized between length of experience with treatment and outlook. Although patients who have recently started treatment for end stage renal disease may be depressed and may have a somewhat negative outlook, it is also likely that patients who have long experience with their treatment may become discouraged and have a negative outlook on life.

No direct linkages were hypothesized between the exogenous variables and quality of life. Rather, it was hypothesized that the effect of these variables on quality of life was entirely indirect, and occurred as a result of their effects on outlook, health, and/or functional status.

The measurement model is also specified in Figure 5.1. Each of the variables has been operationally defined in Chapter III. In summary, the latent variables, support, outlook, and health were measured by single indicators (i.e., patients' reports of these concepts). Treatment modality, diagnosis, and length of experience with the treatment were also measured by single indicators. These data were obtained from the patient where possible. In the event that the patient indicated uncertainty regarding the item or question, the patient records were reviewed to obtain the data. Two indicators of functional status were used: self-reported ability to perform activities of daily living and self-reported ability to work. Three indicators of quality of life were used: the Self-Anchoring Striving Scale (SASS), the Time Trade Off Technique (TTO), and the Index of Well-Being (IWB). These measures were described in greater detail in Chapter III.

In estimating the measurement model, one of the (lambda) coefficients linking the concept to the indicator was set at one, in order to set the scale of the latent variable. Where multiple indicators were available, the best indicator (in the judgment of the researcher) was selected and fixed.

With the exception of the latent variables for which multiple indicators were available (i.e., functional status and quality of life), measurement errors (theta deltas and theta epsilons) were initially fixed (rather than estimated) in order to facilitate estimation of the entire model. The values were fixed based on impressions of the accuracy of measurement of the concepts. For instance, it was expected that the exogeneous variables, treatment modality and diagnosis, could be measured with considerable accuracy. There would be little doubt on the part of the patient about the form of treatment he was receiving and his/her diagnosis (i.e., whether or not he was diabetic). A limited amount of error might be expected as a result of errors in coding. Hence, an estimate of 10% error variance (i.e., random variance, not of a systematic nature, as in bias) was considered to be very conservative. It is possible that a slightly larger error variance occurred in measurement of the length of experience with the treatment, since this requires some recall on the part of the patient. It is possible that a patient might not remember the precise month his treatment was initiated. However, it is unlikely that there would be large differences from the actual length of experience. Again, a 10% measurement error was fixed. The variable, support, was also assigned a measurement error of 10%. It is possible that subject may have had some difficulty identifying the most appropriate response since there were two aspects to the item (i.e., good relationships with others and strong support).

The endogenous variables, outlook, health, and functional status (ability to work), were assigned a measurement error of 20%. These concepts are somewhat esoteric, and are generally considered to be more difficult to measure accurately. Also, the possible responses to the items were two pronged, and a few people may have been confused about the most appropriate response if some aspects of two possible responses actually reflected their situations. For example, for the item measuring outlook, the patients were asked to indicate the extent to which they felt calm and positive about their future and felt in control of their personal circumstances. It is possible that a patient would feel calm and positive about the future but not at all in control of their personal circumstances. The most accurate response is not available as an option. Hence, in this type of situation, some measurement error is inevitable. Although the subjects did not identify this as a concern at the time of the interview, the potential for measurement error exists in these items. Measurement error of the second indicator of functional status (ability to perform activities of daily living) was estimated by leaving its value free to fluctuate above or below an initial start value of 10% error variance. On estimation, the error variance was found to be 67.6%. This error variance is considerably higher than was expected. It seems that this indicator is a relatively poor measure of functional status.

The theta epsilons for two of the measures of quality of life were also left free to fluctuate above and below initial starting values of 10% of the variance on the Self Anchoring Striving Scale and the Time Trade Off. On estimation, the measurement error variance for the SASS was found to be 46.5%, and the measurement error variance for the TTO was found to be 48%. The measurement error for the Index of Well-Being was fixed at 20%.

Because the measurement error was fixed for many of the manifest variables and because the model precluded estimation of all the error variances, a series of LISREL models were estimated replacing the specified error variance with the minimum conceivable error variance and maximum conceivable error variance (i.e., generally half and double the fixed error variance). With three exceptions, there were minimal differences in the ability of the model to fit the data, and no substantial or systematic shifts in the estimates of the various parameters when these alternative measurement error specifications were used. However, when the measurement error of the outlook variable was doubled (from 30 to 60%), the iterations would not converge. A sensitivity analysis was done and it was found that a fixed measurement error up to 50% of the variance of the variable would yield reasonable estimates. When the measurement error of the ability to work indicator of functional status was halved (from 30 to 15%), the iterations would not converge. However, measurement error variances above 20% also yielded reasonable estimates, very similar to those obtained in the reported model. Also, when the theta epsilon for the IWB was increased to 50%, there was a marked increase in the Chi-square; however, the nature and magnitude of the effects in the model remained much the same. Overall, there was no evidence that suggested that substantial changes in the specified measurement quality altered the results in other portions of the model.

The initial model (as depicted in Figure 5.1) was estimated and is included in Appendix 7. The chi-square with 31 degrees of freedom was 84.16 (probability of .000). These findings suggest that the model does not fit the data. More precisely, there is a very low probability (.000) that the differences between the model-and-coefficient implied covariance matrix and the observed data covariance matrix could be due to sampling fluctuations alone.

Based on the residuals and the modification indices, it appeared that further changes were required; that is, the proposed model had failed. After a reconsideration of theoretical perspectives, several changes were made to the model. It seemed that there were also direct (as well as indirect) effects of treatment modality and support on quality of life. When these gammas were freed, a Chi-square of 48.42 (df=29, p=.01) was obtained. Several changes (delineated below) were also made to the estimates of measurement error, based on the modification indices and the partial derivatives. The theta deltas and theta epsilons could not be freed without creating estimation (colinearity) problems. However, the theta epsilons for the variables, outlook, health status, reported ability to work (indicator of functional status) were raised from 20% to 30% of the variance of the variable, and the theta epsilon for the Index of Well-Being (an indicator of QOL) was raised from 20% to 27%.

Because there were several fairly large modification indices in the lambda Y matrix, the effects of several endogenous variables on some of the manifest variables were reconsidered. It is quite likely that the health status of the patient affects his/her ratings on the SASS and IWB directly, in addition to the effect (beta) on QOL. Also, it seemed probable that outlook could affect the ratings on the IWB. These lambdas were freed; the effects were found to be significant.

The modification indices also suggested that there might be a covariance between the measurement errors of the IWB and the TTO. It was thought that some common cause could affect both variables (e.g., social desirability of response). This covariance was freed and was found to be significant but negative in direction suggesting that there are some systematic differences between the measurement of these variables. This observation is an indication that the structural part of the model is "overfitting" the covariance between these indicators. The correlation that is implied between the measurement errors of the TTO and the IWB is -.38.

With these changes, the revised model fit the data (Chi-square=31.35, df=24, p=.144; see Appendix 8 for computer output). That is, there is about a 1 in 7 chance that the differences between the model-and-coefficient implied covariance matrix and the observed data covariance matrix could be due to sampling fluctuations. More changes were made to the model than would have been desirable; however, the changes were limited to those that seemed logical from a theoretical perspective.

Several other revisions to the model were attempted, but were not included in the final model. It was hypothesized, on further consideration, that QOL might influence an individual's reports of his/her outlook. Hence, a lambda was inserted into the model from the endogeneous variable, quality of life, to the manifest variable, reported outlook. Although this modification resulted in a significant improvement in the model, the estimated path was negative in direction. That is, the effect was opposite to that which had been expected. Because this finding was contrary to the theoretical propositions relating to quality of life, this path was not included in the final model. It was also noted that the effects of two of the exogeneous variables, namely diagnosis and length of experience with treatment, were small. An attempt was made to drop these variables from the model. However, no real improvement in the fit of the model resulted from this manipulation.

This model and the LISREL estimates for the effects are depicted in Figure 5.2. In summary, it was found that outlook had a significant direct effect on QOL. A one unit increase in the outlook variable resulted in a 1.699 unit increase in the predicted value of QOL. The effect of health status on QOL was not significant. However, health status had a significant effect on functional status; a one unit increase in health status resulted in a .839 unit increase in the predicted value of functional status. Also, functional status had a significant direct effect on QOL; a one unit increase in the functional status variable resulted in a .873 unit increase in the predicted value of QOL.

The exogenous variable, support, had a significant effect on outlook and health status (but not on functional status and QOL). A one unit increase in support resulted in a .206 unit increase in outlook and a .288 unit increase in health status. None of the exogenous variables had a significant effect on functional status.

Treatment modality had a significant effect on health status and on QOL (but not on outlook and functional status). A change in treatment modality from dialysis to transplantation resulted in a 1.826 unit increase in the predicted value of QOL and a .345 unit increase in the predicted value of health status.

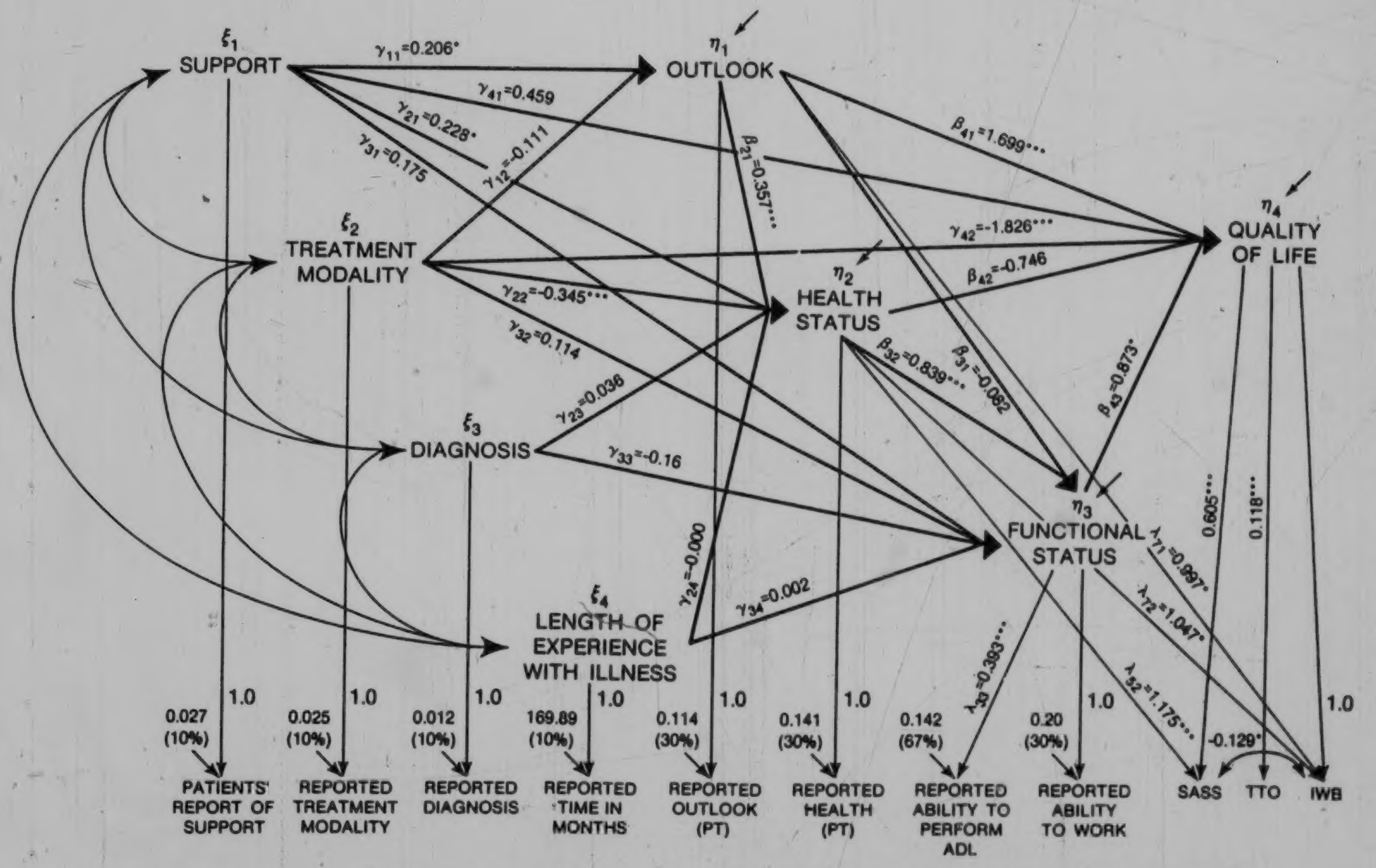

ξ1
SUPPORT
ξ2
TREATMENT MODALITY
ξ3
DIAGNOSIS
ξ4
LENGTH OF EXPERIENCE WITH ILLNESS
η1
OUTLOOK
η2
HEALTH STATUS
η3
FUNCTIONAL STATUS
η4
QUALITY OF LIFE
γ11=0.206*
γ41=0.459
γ21=0.228*
γ31=0.175
γ12=-0.111
γ42=-1.826***
γ22=-0.345***
γ32=0.114
γ23=0.036
γ33=-0.16
γ24=-0.000
γ34=0.002
β21=0.357***
β41=1.699***
β42=-0.746
β32=0.839***
β31=-0.082
β43=0.873*
λ71=0.997*
λ72=1.047*
λ52=1.175***
λ33=0.393***
0.605***
0.118***
-0.129*
1.0
1.0
1.0
1.0
1.0
1.0
1.0
1.0
1.0
0.027 (10%)
0.025 (10%)
0.012 (10%)
169.89 (10%)
0.114 (30%)
0.141 (30%)
0.142 (67%)
0.20 (30%)
PATIENTS' REPORT OF SUPPORT
REPORTED TREATMENT MODALITY
REPORTED DIAGNOSIS
REPORTED TIME IN MONTHS
REPORTED OUTLOOK (PT)
REPORTED HEALTH (PT)
REPORTED ABILITY TO PERFORM ADL
REPORTED ABILITY TO WORK
SASS
TTO
IWB

Figure 5.2 Maximum Likelihood Estimates of Patients' Perceptions of their Quality of Life (Revised)

Although this model seemed to be consistent with the data, it was suspected that the TTO was different from the other measures of QOL since it seemed that different cognitive processes might be used in assessing one's life using this instrument. However, this suspicion was not justified, since the QOL did explain 53% of the variance of the indicator, TTO. Two other models were estimated and are discussed. In the first model, the Self-Anchoring Striving Scale (SASS) and the Index of Well-Being (IWB) were used as indicators of QOL; in the second model, the TTO was used as a single indicator of QOL.

Two Indicator Model

As much as possible, the two indicator (SASS and IWB as indicators of QOL) model was specified in the same was as the three indicator model that was previously described. However, the additional lambdas and the covariance between two of the theta epsilons were not freed. This two indicator model had a Chi-square of 24.14 (df=19, p=.19). The maximum likelihood estimates are provided in Table 5.1. It should be noted that the difference in the magnitudes of the coefficients obtained in the double and single indicator models is largely the result of the differences in the scaling of the variables. For instance, the scale on the TTO is from 0 to 1, while the scale on the IWB ranges up to 14.7. To facilitate interpretation and comparison, standardized coefficients for the betas and gammas are also presented in the table.

Table 5.1

Comparison of LISREL Maximum Likelihood Estimates for Double and Single Indicator Models

Parameter	Double Indicator	Single Indicator
Beta 2, 1 (Outlook to Health)	.306***(.324)	.362***(.326)
Beta 3, 1 (Outlook to Functional Status)	-.092 (-.071)	-.106 (-.083)
Beta 4, 1 (Outlook to QOL)	2.426***(.489)	.201***(-.345)
Beta 3, 2 (Health to Functional Status)	.847***(.781)	.858***(.741)
Beta 4, 2 (Health to QOL)	.445 (.100)	-.080 (-.152)
Beta 4, 3 (Functional Status to QOL)	.947 (.247)	.094 (.208)
Gamma 1, 1 (Support to Outlook)	.192* (.184)	.192* (.184)
Gamma 2, 1 (Support to Health)	.216* (.187)	.218* (.188)
Gamma 3, 1 (Support to Functional Status)	.187 (.139)	.184 (.137)
Gamma 4, 1 (Support to QOL)	.734* (.142)	.001 (.001)
Gamma 1, 2 (Treatment to Outlook)	.119 (-.109)	-.119 (-.109)
Gamma 2, 2 (Treatment to Health)	-.358***(-.295)	-.362***(-.298)
Gamma 3, 2 (Treatment to Functional Status)	.012 (.009)	.023 (.017)
Gamma 4, 2 (Treatment to QOL)	-1.552***(-.286)	-.267***(-.420)
Gamma 2, 3 (Diagnosis to Health)	.003 (.002)	.024 (.014)
Gamma 3, 3 (Diagnosis to Functional Status)	-.123 (-.060)	-.148 (.073)
Gamma 2, 4 (Experience to Health)	-.000 (-.003)	-.000 (-.014)
Gamma 3, 4 (Experience to Functional Status)	.002 (.099)	.002 (.113)
Lambda Y 3, 3 (Ability to perform activities of daily living	.392***	.404***
Lambda Y 5, 4 (SASS)	.613***	N/A
Theta epsilon 3, 3 (Ability to perform activities of daily living [functional status])	.142***	.139***
Theta epsilon 5, 5 (SASS)	2.069***	N/A
Proportion of Explained Variance		
Eta 1	.052	.052
Eta 2	.295	.298
Eta 3	.593	.607
Eta 4	.723	.351
Chi square	24.14	12.17
df	19	11
probability	.191	.351

*p<.05
**p<.01
***p<.001

NOTE: The standardized solutions are provided in parentheses to facilitate comparisons between the models.

As hypothesized, the endogeneous variable, outlook, had a significant direct effect on quality of life. A one unit increase in the outlook measure resulted in a .360 unit increase in QOL, when other variables were controlled. The direct effect of health on QOL was not significant, but an indirect effect was noted through functional status. The total effect (i.e., the sum of the direct plus all the indirect effects) of health on quality of life was 1.246. As well, the effect of functional status on QOL was not significant. The exogenous variable, support, had direct as well as indirect effects (through outlook, health, and functional status) on QOL. A one unit increase in the support variable resulted in a .734 unit increase in the predicted value of QOL when the other predictor variables were controlled. The total effect of support (direct and indirect) on QOL was 1.716 (with other variables controlled). Treatment modality had a direct effect on QOL, as well as indirect effects through outlook and health status. In comparing the treatment modalities of dialysis and transplantation, dialysis patients had a predicted decrease in QOL of 1.552 units. The total effects (direct and indirect) of treatment modality on QOL were 2.319 units. There was no significant effect of treatment modality on functional status. The effects of the last two exogenous variables, diagnosis and length of experience with treatment, on the various endogenous variables were not significant.

In summary, the revised model using two indicators of QOL (the SASS and IWB) was consistent with the data. The estimates of effects largely supported the propositions contained within the model (see Table 5.1). Furthermore, the modification indices generated by the LISREL program were relatively low. The highest modification indices pertained to the covariances between the theta epsilons. It appeared that there could be a relationship between the error variances of the outlook variable and the two measures of QOL (SASS and IWB), and between the error variances of the health variable and the two measures of QOL. It is quite possible that a common factor (such as social desirability) could have affected the measurement errors of these pairs of variables.

The effects of this two indicator model are essentially the same as those noted in the three indicator model, with two exceptions. In the three indicator model, the effect of functional status on QOL was significant; in the two indicator model, this effect approaches, but does not reach statistical significance. Also, in the three indicator model, the direct effect of support on QOL approached, but did not attain statistical significance; in the two indicator model, the effect of support on QOL was significant ($p <.05$).

One Indicator Model

When the same basic model (see Figure 5.1) was used to explain QOL as measured by the TTO alone, a Chi-square of 12.17 was observed (df-11, p-.351). This suggests that this model is also consistent with the data. That is, it is quite possible that any differences between the model-and-coefficient implied variance-covariance matrix and the observed data covariance matrix occured by chance as a result of sampling fluctuations.

In the single indicator (TTO) model, the effects are virtually identical to those noted in the double indicator (SASS, IWB) model of patients' perceptions of QOL (see Table 5.1). The apparent differences in size of the effects do not indicate differences in strengths of the effects. Rather, this difference is a function of the smaller variance of the TTO variable. If the size of each effect in the double indicator model is multiplied by the lambda obtained for the TTO in the triple indicator model (i.e., .118), one would find that the size of the effects for the two models is very similar. As hypothesized, the endogeneous variable, outlook, had a significant effect on QOL. A one unit increase in the outlook variable resulted in a .201 unit increase in the predicted value of QOL on the TTO, when other variables were controlled. As in the double indicator model and contrary to the hypothesis, health status and functional status were not significant predictors of QOL.

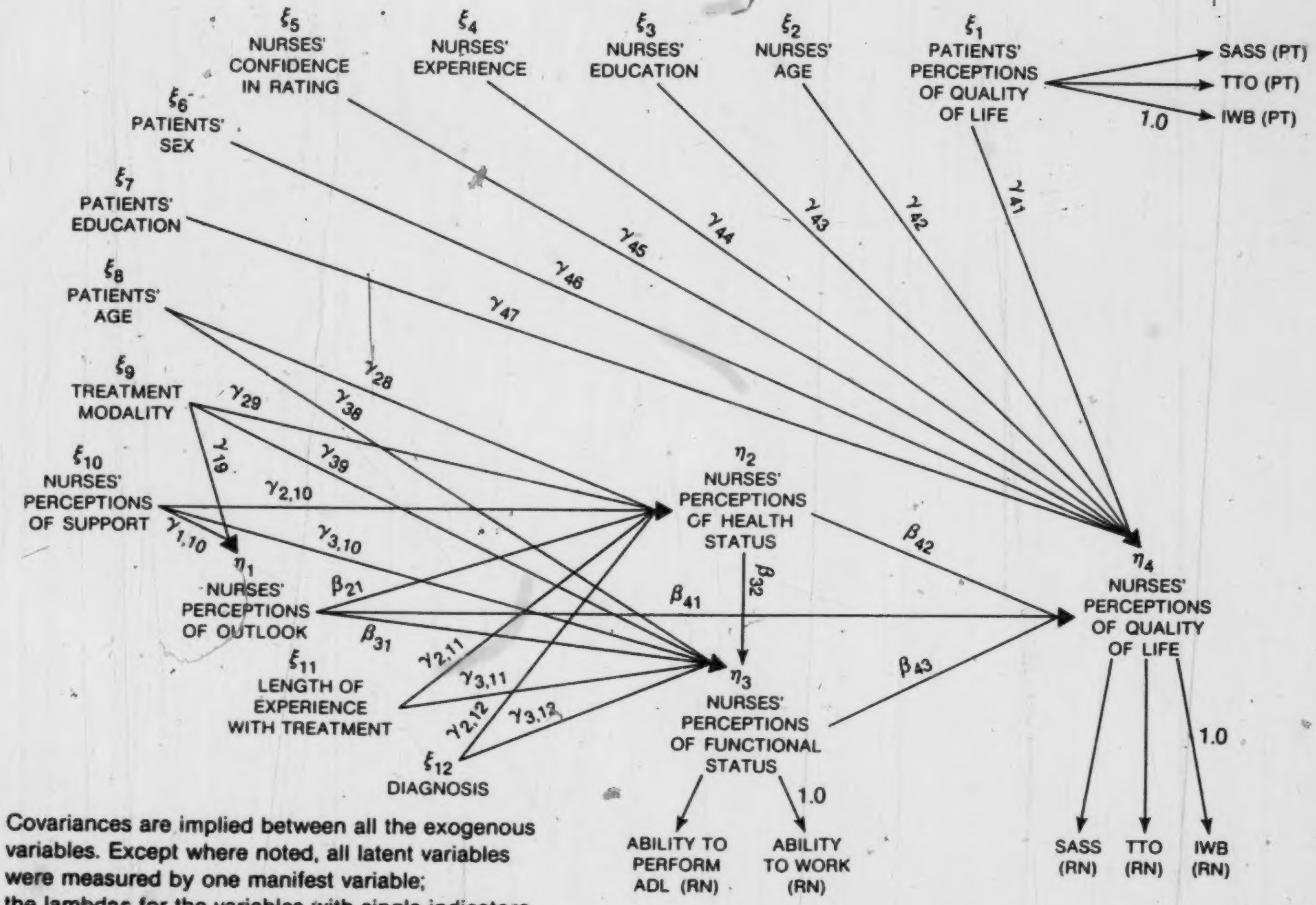
The endogeneous variable, treatment modality, had a significant direct effect on QOL, as well as a significant indirect effect through health status. Comparing patients receiving different treatment modalities, dialysis patients had a predicted QOL on the TTO that was .267 units lower than the transplant patients. The total effect (including direct and indirect effects) of treatment modality on QOL was .288 units. The support variable did not have a significant direct effect on QOL in the single indicator model, as it did in the double indicator model. However, the effects of support on outlook and support on health were significant. Again, contrary to the hypothesis, the effect of support on functional status was not significant. The total effect of support on the TTO measure of QOL was .055 units. As in the double indicator model, the effects of the last two exogeneous variables, diagnosis and length of experience with the treatment were not significant.

It appears that the single (TTO) and double (IWB, SASS) models of the patients' perceptions of QOL are very similar. With one exception (related to the support variable), the same effects are significant. In summary, it appears that the same data fit both the triple, double, and single indicator models of patients' perceptions of QOL (with minor differences in specification of the models).

Model of Nurses' Perception of their Patients' Quality of Life

Another model was proposed to explain the nurses' perceptions of the QOL of patients with ESRD. This model is depicted in Figure 5.3, and is described in the following paragraphs.

A number of hypotheses were proposed that implied direct effects on QOL. It was hypothesized that the patients' perceptions of their QOL would cause the nurses' perceptions of the patients' QOL. Since nurses obtain much of their information about patients from the patients themselves, and their perceptions about the QOL of their patients are formulated using this information, it was hypothesized that patients' perceptions of their QOL would affect the nurses' perceptions. It was also hypothesized that nurses' age would have an


ξ_5 NURSES' CONFIDENCE IN RATING
ξ_4 NURSES' EXPERIENCE
ξ_3 NURSES' EDUCATION
ξ_2 NURSES' AGE
ξ_1 PATIENTS' PERCEPTIONS OF QUALITY OF LIFE
SASS (PT)
TTO (PT)
IWB (PT)
1.0
ξ_6 PATIENTS' SEX
ξ_7 PATIENTS' EDUCATION
ξ_8 PATIENTS' AGE
ξ_9 TREATMENT MODALITY
ξ_{10} NURSES' PERCEPTIONS OF SUPPORT
γ_{41}
γ_{42}
γ_{43}
γ_{44}
γ_{45}
γ_{46}
γ_{47}
γ_{28}
γ_{38}
γ_{29}
γ_{19}
γ_{39}
$\gamma_{2,10}$
$\gamma_{1,10}$
$\gamma_{3,10}$
η_2 NURSES' PERCEPTIONS OF HEALTH STATUS
β_{32}
β_{42}
η_1 NURSES' PERCEPTIONS OF OUTLOOK
β_{21}
β_{41}
β_{31}
η_4 NURSES' PERCEPTIONS OF QUALITY OF LIFE
ξ_{11} LENGTH OF EXPERIENCE WITH TREATMENT
$\gamma_{2,11}$
$\gamma_{3,11}$
$\gamma_{2,12}$
$\gamma_{3,12}$
η_3 NURSES' PERCEPTIONS OF FUNCTIONAL STATUS
β_{43}
ξ_{12} DIAGNOSIS
1.0
ABILITY TO PERFORM ADL (RN)
ABILITY TO WORK (RN)
1.0
SASS (RN)
TTO (RN)
IWB (RN)

NOTE: Covariances are implied between all the exogenous variables. Except where noted, all latent variables were measured by one manifest variable; the lambdas for the variables with single indicators were fixed at one.

Figure 5.3 Model of Nurses' Perceptions of QOL of Patients with ESRD (Total)

effect on their perceptions; it is possible that younger nurses might perceive their patients' QOL to be lower, if they compare their own lives to those of their patients. Also, it was hypothesized that the education of the nurse might affect the nurses' perceptions. It has been suggested that nurses with more education (i.e., a baccalaureate degree) have better communication skills (Johnson, 1988) and may have a greater understanding of what the patient's life is like. Hence, better educated nurses may be better able to describe the QOL of their patients, and may rate the patients' QOL systematically higher or lower than nurses with less education. Also, nurses with more experience may understand the plight of their patients better than nurses with less experience, and may rate the patients' QOL as higher or lower than less experienced nurses. The confidence a nurse has in her rating of QOL of the patient is a reflection of how well she knows that patient. It was hypothesized that the degree of confidence would affect the nurses' perceptions of the patients' QOL.

It was also hypothesized that patients' sex and education would have direct effects on the nurses' perceptions of the patients' QOL. While the gender of the patient does not affect his/her health or functional status, the effects of the illness and its treatment are particularly onerous for the breadwinners of families, who are predominantly male. As a result, sex of the patient may affect the nurses' perceptions of the patients' QOL. Also, patients who are better educated may be seen by the nurses as having a higher QOL, since they are better equipped to modify their lifestyles in order to adapt to the disease and its treatment.

As in the model of the patients' QOL, it was hypothesized that three endogenous variables, nurses' perceptions of the patients' outlook, health status, and functional status would directly affect the nurses' perceptions of the QOL of their patients. It was hypothesized that if the nurses perceived their patients' outlook to be high, they would also perceive their QOL to be high. Also, if they perceived the patients' health and functional status to be high, they would also perceive the patients' QOL to be high.

A number of exogenous variables that have indirect effects on the nurses' perceptions of QOL (through the endogenous variables, nurses' perceptions of outlook, health status, and functional status) were included in this model. These include: age of the patient, treatment modality, nurses' perceptions of support, patients' length of experience with the treatment, and patients' diagnosis.

It was hypothesized that the nurses' perceptions of the patients' health status and functional status would be influenced by the patients' age. Older patients may be less healthy and have a lower functional status. No effect was hypothesized between age and outlook.

It was hypothesized that treatment modality would affect the nurses' perceptions of QOL through its effects on the nurses' perceptions of outlook, health, and functional status. Nurses generally believe that people who have received renal transplants have a positive outlook, better health, and higher functional status than do dialysis patients.

It was also hypothesized that the nurses' perceptions of support would affect their perceptions of QOL through their effects on their perceptions of outlook, health status, and functional status. Nurses who believe that their patients are recipients of significant family and social support are more likely to perceive that their patients have a positive outlook, good health, and a higher functional status.

It was also hypothesized that the length of experience that a patient has with his/her treatment modality affects the nurses' perceptions of the patients' health and functional status. Patients who have recently started dialysis or who have recently been transplanted are less likely to be perceived by nurses as being in an optimal state of health or functional status. No relationship was hypothesized between length of experience with treatment and the nurses' perception of the patients' outlook.

Since there is a sizable body of literature that suggests that diabetic patients have many more physical problems than do non-diabetic patients, the model also includes paths between diagnosis and the nurses' perceptions of health and functional status. No path was included between diagnosis and outlook since there is little, if any, evidence that diabetics have any more (or less) difficulty adjusting to ESRD than do other individuals.

Regarding the endogenous variables, it was again hypothesized that the nurses' perceptions of the patients' outlook, health status, and functional status have direct effects on their perceptions of the patients' QOL. Also, it was hypothesized that the nurses' perceptions of the patients' outlook would have a significant effect on their perceptions of the patients' health and functional status. If a patient was perceived as having a positive outlook, it is likely that s/he would be perceived by the nurses' as being healthier and more likely to be able to work and care for him/herself. Also, an effect was hypothesized between the nurses' perceptions of the patients' health status and their perceptions of functional status. It seems reasonable to expect that if a person is perceived as healthy, he/she would also be perceived as having a high functional status.

The measurement model is specified in Figure 5.3. Except where noted, all variables were measured using single indicators. The variables were operationally defined in Chapter III. Two indicators were used to measure the nurses' perceptions of the patients' functional status: the ability to perform activities of daily living and the ability to work. Three indicators of QOL were used for both the patients' perceptions and the nurses' perceptions. These included: the Self-Anchoring Striving Scale (SASS), the Time Trade Off (TTO), and the Index of Well-Being (IWB).

In estimating the measurement model, one of the lambda coefficients linking the concept to the indicator was fixed at one, in order to set the scale of the latent variable. Where multiple indicators were available, the investigator selected and fixed the best (in her judgement) indicator at one.

Measurement errors of the indicators (theta deltas and theta epsilons) were fixed, with the exception of the latent variables for which there were multiple indicators. It was expected that nurses' education, length of experience in the role, confidence in their rating, patients' sex, education, and age could be measured with considerable accuracy. Hence, an estimate that 10% of the variance of the indicator could be attributed to error would be considered to be very conservative. The measurement error of treatment modality and diagnosis was thought to be in the same range. The variable, nurses' age, was initially assigned a measurement error variance of 10%. The diagnostics accompanying attempts to estimate this model suggested a downward revision, so a 5% error variance was used. The measurement error variances of the indicators of support and outlook were fixed at 20% since these concepts are somewhat esoteric and are generally considered to be more difficult to measure. For similar reasons, the measurement error variance of the measure of the nurses' perceptions of the patients' functional status (ability to work) was fixed at 20%. Also, length of experience with treatment modality was assigned a measurement error of 20%, since it is possible that patients may have had difficulty recalling the specific month when they began treatment. The measurement error of the IWB was fixed at 20%. The measurement errors of one of the indicators of the nurses' perceptions of functional status (ability to perform activities of daily living) and two of the indicators of QOL (TTO and SASS) for both patients and nurses were estimated by leaving the values free to fluctuate above or below an initial start value of 20% error variance. On estimation, the LISREL estimates indicated that the error variance of the indicator of functional status was about 58.5%, and the error variances of the SASS and the TTO were 44.5% and 73.7% respectively. These error variances are surprisingly large. However, it is quite probable that more measurement error occurs when health care professionals rate the QOL of their patients than when patients rate their own QOL.

Because the measurement errors of most of the indicators were fixed and it was not possible to estimate these coefficients, a series of LISREL models were again estimated, replacing the specified error variance with the minimum and maximum reasonable error variances. Overall, there was no evidence that fixing the measurement quality substantially altered the results in other portions of the model.

The initial model (as depicted in Figure 5.3) was estimated and is included in Appendix 9. The Chi-square with 114 degrees of freedom was 361.42 (probability of .000). This suggests that it is highly unlikely that the differences between the model-and-coefficient implied variance-covariance matrix and the observed data covariance matrix occurred as a result of only sampling fluctuations. That is, the model did not fit the data and hence any summary of effects should be interpreted with considerable caution.

A summary of the LISREL estimates for this model are included in Table 5.2. Many of the hypotheses were not supported; that is, many of the effects were not statistically significant. Of the 25 possible effects, 10 were found to be significant.

Table 5.2

Comparison of LISREL Maximum Likelihood Estimates for Triple Indicator Models of Nurses' and Physicians' Perceptions of QOL

Parameter	Nurses	Physicians
Beta		
Outlook to Health	.737***	.773***
Outlook to Functional Status	-.118	-.517*
Outlook to QOL	3.696***	2.759***
Health to Functional Status	.423*	1.125**
Health to QOL	.482	-.558
Functional Status to QOL	.588*	1.332**
Gamma		
QOL (Patient) to QOL (Health care professionals [HCP])	.184**	.240***
HCP age to QOL (HCP)	-.009	.105***
HCP education to QOL	-.921*	-.748
HCP experience to QOL	.028	
Confidence in rating to QOL	.341	.540**
Patients' sex to QOL	-.523	-.697**
Patients' education to QOL	.185***	-.025
Patients' age to Health Status	-.003	-.001
Patients' age to Functional Status	-.003	.002
Treatment modality to Outlook	-.080	-.290***
Treatment modality to Health	-.228**	-.289***
Treatment modality to Functional Status	-.510***	-.095
Support to Outlook	.438***	.561***
Support to Health Status	.073	.018
Support to Functional Status	.059	.248
Experience with Treatment to Health	-.001	.000
Experience with Treatment to Functional Status	-.002	-.001
Diagnosis to Health	-.091	.076
Diagnosis to Functional Status	-.153	-.237*
Lambda		
QOL (Patient) to SASS	.648***	.612***
QOL (Patient) to TTO	.079***	.075***
Functional Status to Ability to Perform Activities of Daily Living	.360***	.460***
QOL (HCP) to SASS	.392***	.671***
QOL (HCP) to TTO	.053***	.077***

Table 5.2. con't

Parameter	Nurses	Physicians
Theta Delta		
SASS (QOL - Patient)	1.662***	1.701
TTO (QOL - Patient)	.055***	.074
Theta Epsilon		
Ability to Perform Activities of Daily Living (Functional status)	.071***	.093***
SASS (QOL - HCP)	1.216***	.517***
TTO (QOL - HCP)	.071***	.027***
Proportion of Explained Variance		
Eta 1	.201	.382
Eta 2	.603	.502
Eta 3	.368	.720
Eta 4	.860	.859
Chi square	361.42	367.38
df	114	107
probability	.000	.000

*p<.05
**p<.01
***p<.001

Although several of the hypothesized effects were significant, the model as a whole failed dismally. The modification indices suggested numerous problems. Firstly, there were numerous large modification indices for the lambda coefficients. Again, the modification indices suggested that the measures of QOL could also be indicators of health status. However, given the definitions and operationalizations of the concepts, such a change is not appropriate. Also, large modification indices were noted for lambda coefficients relating to the patients' perceptions of QOL (i.e., from patients' age, length of experience with treatment, diagnosis, and nurses' perceptions of support). The same variables had high modification indices for the lambda coefficients for the variables, nurses' education and nurses' experience. The modification indices for the variable, patient sex, suggested a path to two of the indicators of the patients' reports of QOL (SASS, IWB). Large modification indices were also noted for: the lambda X for patient age in relation to the indicators for treatment modality and nurses' perceptions of patients' support; the lambda X for treatment modality in relation to the patients' report on the TTO; and the lambda X for diagnosis in relation to the patients' reports on the TTO.

Secondly, the modification indices for the beta and gamma coefficients suggest that several additional paths are possible. These include: health status on outlook; functional status on outlook; patients' perceptions of QOL on the nurses' perceptions of outlook, health status, and functional status; and nurses' education on their perceptions of health status.

Thirdly, it was noted that the modification indices for several of the measurement error variances were high. Specifically, there were some problems with the fixed error variances of treatment modality, diagnosis, and the patients' reports on the IWB.

In an attempt to improve the model, several changes were made to the model. Based on the modification indices, the measurement error variances of the variables, treatment modality, diagnosis, and ability to work (functional status) were increased to 25% (from 10%, 10%, and 20% respectively). The error variances of the nurses' perceptions of the patients' support and outlook were increased from 20% to 30% and the error variance of the nurses' perceptions of the patients' QOL on the IWB was revised upward from 20% to 25%. As well, two additional lambdas were freed. It seemed reasonable that the nurses' ratings of the patients' health status and functional status affected their perceptions of the patients' QOL (on the SASS). These revisions resulted in a slight improvement in the Chi-square. It was estimated at 299.06 (df=109; p=.000). The model was still not consistent with the data. Although it seemed reasonable, on the basis of the modification indices and possible theoretical rationales that several other lambda coefficients could be freed (e.g., LY(7,3), LY(1,3), and LY(1,2)), these parameters could not be freed without creating problems in estimation of the model.

Given the high Chi-square and the number of problems with the model, it was apparent that a few additional changes would not improve the fit of the model substantially. Subsequently, a reduced model (similar to that model of patients' perceptions of QOL) was tested. This model is analagous to the model used to explain the patients' perceptions of their QOL. It is depicted in Figure 5.4.

In this model, it was again hypothesized that the nurses' perceptions of the patients' outlook, health status, and functional status had direct effects on the nurses' perceptions of the patients' QOL. Effects were also hypothesized between the nurses' perceptions of outlook and their perceptions of health status and functional status and between the nurses' perceptions of the health status and the functional status of their patients. Indirect effects of the patients' treatment modality, length of experience with the treatment, diagnosis, and the nurses' perceptions of the patients' support on the nurses' perceptions of the patients' QOL were also hypothesized. It was proposed that treatment modality and nurses' perceptions of support had direct effects on the nurses' perceptions of the patients' outlook, health status, and functional status, and the the length of experience with the treatment and the diagnosis had direct effects on the nurses' perceptions of health status and functional status.

The measurement structure of this reduced model was similar to the larger model. The lambdas for each of the single indicator variables were fixed at 1.0. Again, there were two indicators of functional status. The lambda of the indicator, ability to work, was fixed at one; the lambda of the other indicator of functional status was left free to be estimated above or below a start value of .5.

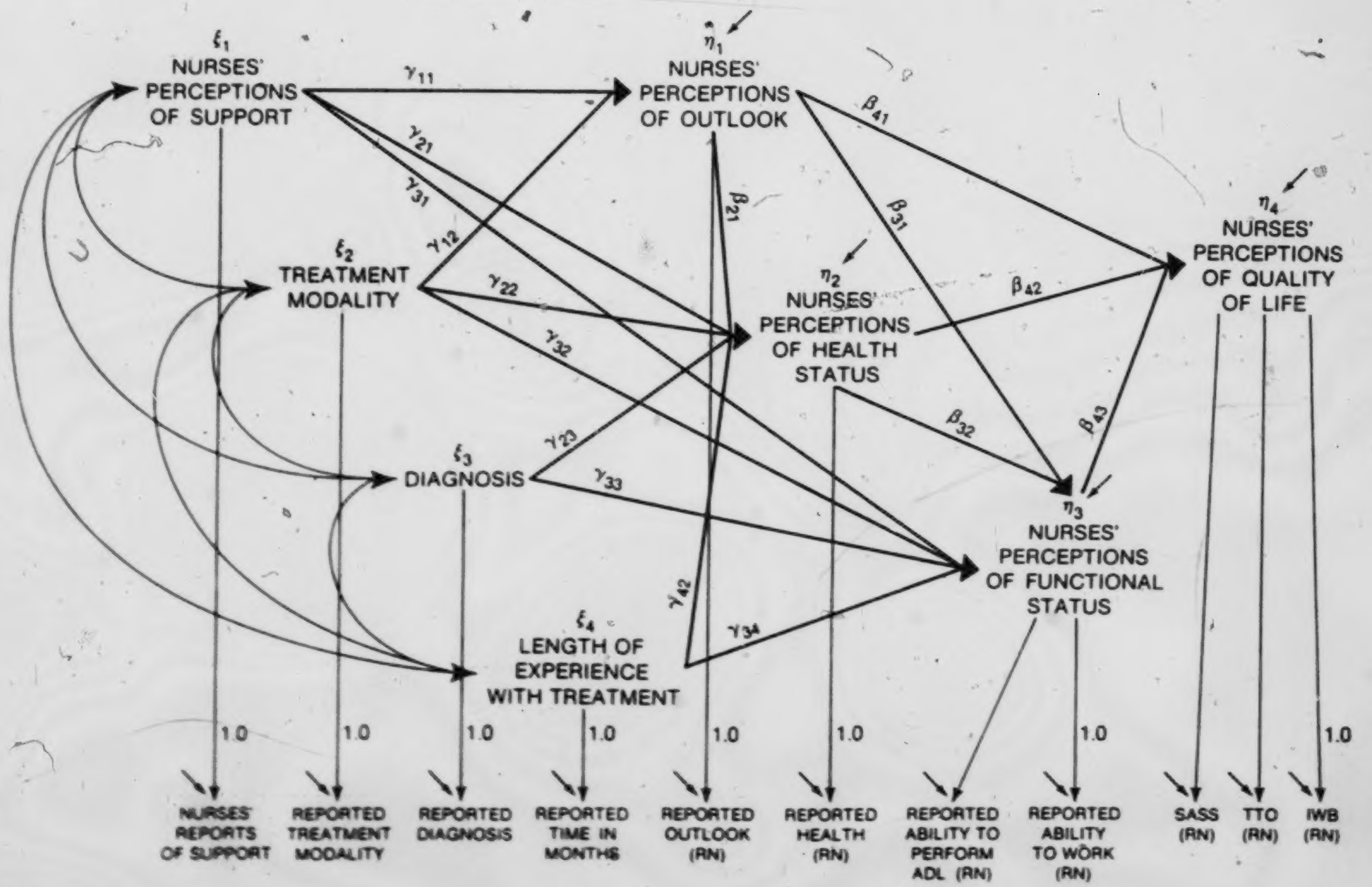

ξ_1
NURSES' PERCEPTIONS OF SUPPORT
ξ_2
TREATMENT MODALITY
ξ_3
DIAGNOSIS
ξ_4
LENGTH OF EXPERIENCE WITH TREATMENT
η_1
NURSES' PERCEPTIONS OF OUTLOOK
η_2
NURSES' PERCEPTIONS OF HEALTH STATUS
η_3
NURSES' PERCEPTIONS OF FUNCTIONAL STATUS
η_4
NURSES' PERCEPTIONS OF QUALITY OF LIFE
γ_{11}
γ_{21}
γ_{31}
γ_{12}
γ_{22}
γ_{32}
γ_{23}
γ_{33}
γ_{42}
γ_{34}
β_{21}
β_{41}
β_{31}
β_{42}
β_{32}
β_{43}
1.0
NURSES' REPORTS OF SUPPORT
REPORTED TREATMENT MODALITY
REPORTED DIAGNOSIS
REPORTED TIME IN MONTHS
REPORTED OUTLOOK (RN)
REPORTED HEALTH (RN)
REPORTED ABILITY TO PERFORM ADL (RN)
REPORTED ABILITY TO WORK (RN)
SASS (RN)
TTO (RN)
IWB (RN)

Figure 5.4 Model of Nurses' Perceptions of QOL of Patients with ESRD (Reduced)

Similarly, for the nurses' perceptions of the patients' QOL, the lambda for the nurses' ratings on the IWB was fixed at 1.0 and the lambda for the nurses' ratings on the SASS and TTO were left free to be estimated above or below an initial start value of .5. This reduced three indicator model was also not successful. The chi-square was 72.95 (df=30, p=.000). That is, there is a very low probability that the differences in the model-and-coefficient implied variance-covariance matrix and the observed covariance matrix could be due to sampling fluctuations.

It was also noted that several of the standardized beta coefficients were estimated to be greater than one. This suggests a problem in identification of the model. A sensitivity analysis was done, whereby the beta coefficient for the effect between health and functional status was fixed at various values. It was found that more reasonable estimates could be found when this coefficient was fixed between values of .4 and .7. In further analyses, the fixed value of .6 was used for estimation of other effects, so all effects are interpretable as conditional on the assumption of an effect of this magnitude of health status on functional status.

Based on the modification indices, several revisions were made to the model. Firstly, the fixed values for the measurement error variances were adjusted. The theta epsilon for the nurses' reports of the patients' outlook was reduced to 15%, and the theta epsilon for the nurses' reports of the patients' health status was increased to 40%. [illegible] measurement error variance of the IWB was raised to 30%

of the variance of the indicator. On estimation, the SASS was found to have an error variance of 38.7% and the TTO was found to have an error variance of 80%. The nurses' reports of the patients' ability to perform activities of daily living was found to have an error variance of 82%. These last two error variances are unusually and unacceptably high. This suggests that the indicators behave very differently from the other fixed indicators, and that the indicators may be tapping concepts other the ones that were postulated.

Based on the modification indices, several further revisions were made to the measurement structure of the model. It seemed reasonable that the nurses' perceptions of the patients' outlook could affect their rating on the IWB, that their perceptions of the patients' functional status could affect their ratings on the SASS, and that their perceptions of the patients QOL could affect their ratings of the patients' outlook. Hence the lambda coefficients between these variables were freed.

The Chi-square for this revised model was 33.58 (df=26; p=.146) (see Appendix 10 for output). This suggests that it is possible that the model-implied and data covariance matrices are similar enough, that any differences could be attributed to sampling fluctuations. However, the lengthy series of modifications required to achieve this fit suggests that considerable caution must be used in interpreting the effects that are reported.

The LISREL estimates for this model are included in Table 5.3. The only significant effects between the endogenous variables were

Table 5.3

LISREL Maximum Likelihood Estimates for Reduced Model (Three Indicator of Nurses' Perceptions of QOL

Parameter	Nurses
Beta	
Outlook to Health	.113
Outlook to Functional Status	-.989
Outlook to QOL	-4.034**
Health to Functional Status	.600 (fixed)
Health to QOL	6.396
Functional Status to QOL	-1.251
Gamma	
Treatment to Outlook	.432**
Treatment to Health	-.311
Treatment to Functional Status	-.067
Support to Outlook	.016
Support to Health Status	.413***
Support to Functional Status	-.015
Experience with Treatment to Health	-.005
Experience with Treatment to Functional Status	-.200
Diagnosis to Health	-.001
Diagnosis to Functional Status	-.003**
Lambda Y	
Ability to Perform Activities of Daily Living (Functional Status)	.248***
SASS	.386***
TTO	.045***
Outlook to IWB	2.017*
Functional Status to SASS	.397***
QOL to Outlook	.182***
Theta Epsilon	
Ability to Perform Activities of Daily Living	.150***
SASS	.918***
TTO	.078***
TTO with IWB	.146***
Ability to Perform ADL with ability to work	.062***

Table 5.3 con't

Parameter	Nurses
Proportion of Explained Variance	
Eta 1	.429
Eta 2	.358
Eta 3	.643
Eta 4	.965

Chi square	33.58
df	26
probability	.146

*p<.05
**p<.01
***p<.001

the effects of health status and outlook on QOL. Between the exogenous and endogenous variables, treatment modality had a significant effect on the nurses' perceptions of their patients' outlook. Also, the nurses' perceptions of the patients' support had a significant direct effect of their perceptions of the patients' health status. Diagnosis had a statistically significant (although probably not clinically significant) effect on functional status. Diabetic patients had a .003 unit lower rating on the predicted value of the nurses' perception of their functional status than did non-diabetics.

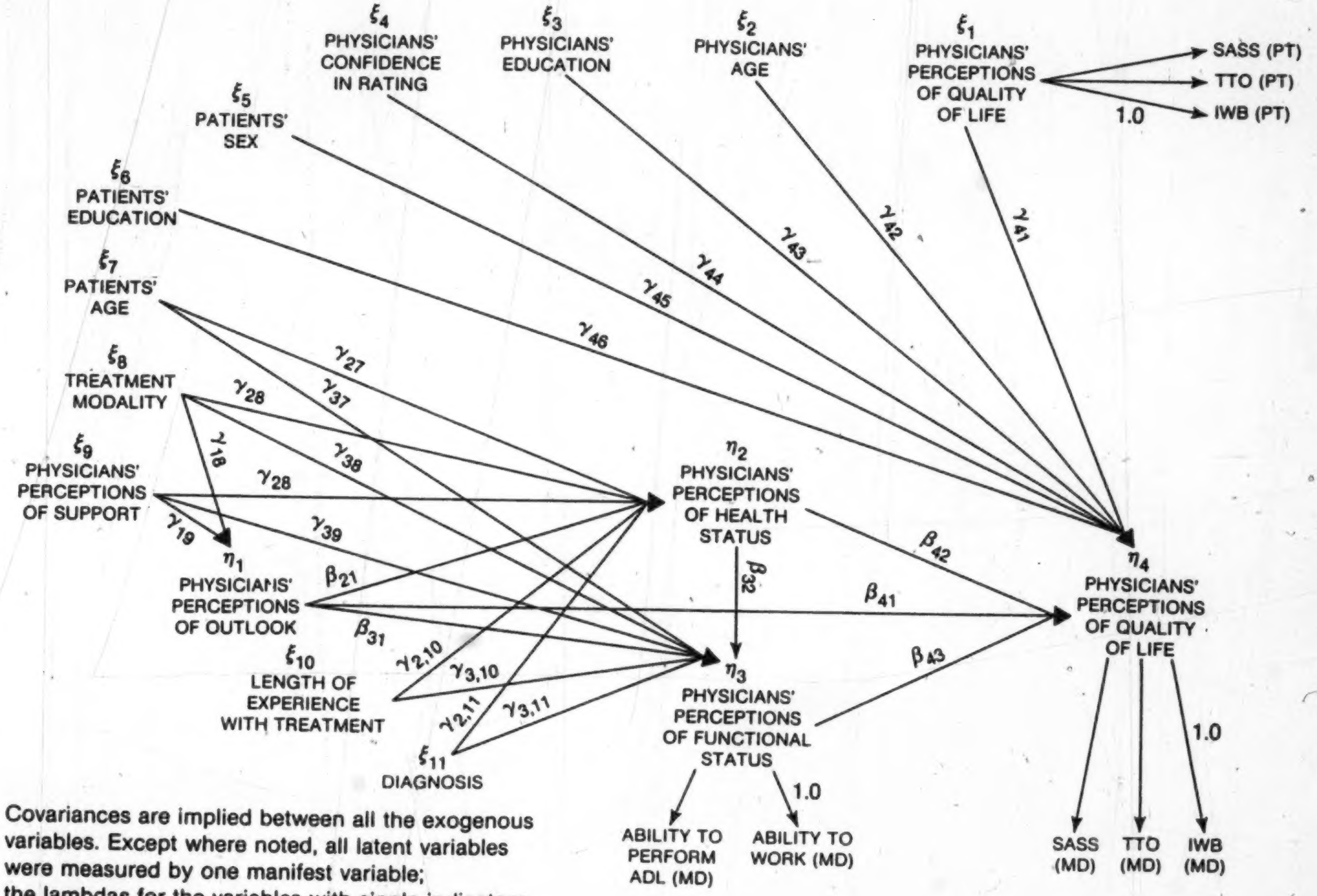
Several of the predicted effects were not significant in this model. For instance, treatment modality did not have a significant effect on the nurses' perceptions of health or functional status. Also, support did not have a significant direct effect on outlook or functional status. Outlook did not have significant effects on health or functional status, and the effect of functional status on QOL was not significant.

As in the previous models, the modification indices suggested that there were some problems with the measurement structure. It appeared from the modification indices for the lambda Y coefficients that the measures of functional status could also be considered to be indicators of health status and QOL. However when attempts were made to free these paths, there were problems in estimating the model, and the iterations would not converge. However, the highest modification index was 3.75, and most of the other modification indices were relatively low. Because of the numerous data prompted revisions that were required to attain a satisfactory fit, all interpretations should be viewed with skepticism.

Model of Physicians' Perceptions of Quality of Life of Patients with End Stage Renal Disease

The model proposed to explain the physicians' perceptions of the QOL of their patients is depicted in Figure 5.5. With one exception, this model is the same as that used to explain the nurses' perceptions of quality of life of their patients. In the physicians' model, the exogenous variable, physicians' experience was not used. This is because there was a high (.904) correlation between physicians' age and physicians' experience, and problems in estimation arose as a result of the colinearity of these variables. Since the justification is so similar to that proposed to explain the nurses' perceptions, it will not be described here. The same rationales are pertinent to the hypotheses contained within this model.

The measurement model is also very similar to that used in the model of the nurses' perceptions. Except where noted on Figure 5.5, all variables were measured using single indicators. (These indicators have been defined previously in Chapter III). The lambda coefficients for these single indicator variables were fixed at one, in order to set the scale of the latent variable. Two indicators were used to measure the physicians' perceptions of the patients'


ξ_4
PHYSICIANS' CONFIDENCE IN RATING
ξ_3
PHYSICIANS' EDUCATION
ξ_2
PHYSICIANS' AGE
ξ_1
PHYSICIANS' PERCEPTIONS OF QUALITY OF LIFE
SASS (PT)
TTO (PT)
IWB (PT)
1.0
ξ_5
PATIENTS' SEX
ξ_6
PATIENTS' EDUCATION
ξ_7
PATIENTS' AGE
ξ_8
TREATMENT MODALITY
ξ_9
PHYSICIANS' PERCEPTIONS OF SUPPORT
γ_{41}
γ_{42}
γ_{43}
γ_{44}
γ_{45}
γ_{46}
γ_{27}
γ_{37}
γ_{28}
γ_{38}
γ_{18}
γ_{28}
γ_{39}
γ_{19}
η_2
PHYSICIANS' PERCEPTIONS OF HEALTH STATUS
β_{42}
β_{32}
η_1
PHYSICIANS' PERCEPTIONS OF OUTLOOK
β_{21}
β_{31}
β_{41}
η_4
PHYSICIANS' PERCEPTIONS OF QUALITY OF LIFE
ξ_{10}
LENGTH OF EXPERIENCE WITH TREATMENT
$\gamma_{2,10}$
$\gamma_{3,10}$
$\gamma_{2,11}$
$\gamma_{3,11}$
η_3
PHYSICIANS' PERCEPTIONS OF FUNCTIONAL STATUS
β_{43}
ξ_{11}
DIAGNOSIS
1.0
ABILITY TO PERFORM ADL (MD)
ABILITY TO WORK (MD)
1.0
SASS (MD)
TTO (MD)
IWB (MD)

NOTE: Covariances are implied between all the exogenous variables. Except where noted, all latent variables were measured by one manifest variable; the lambdas for the variables with single indicators were fixed at one.

Figure 5.5 Model of Physicians' Perceptions of QOL of Patients with ERSD (Total)

functional status: the physicians' ratings of the patients' ability to perform activities of daily living and the ability to work. The same three indicators of QOL, namely the SASS, the TTO, and the IWB, were used for both the patients' and the physicians' perceptions of QOL. In order to set the scale of the latent variable, functional status, the indicator, the physicians' rating of the patients' ability to work, was fixed at one. For the other latent variable with multiple indicators, namely, the physicians' perceptions of the patients' QOL, the IWB indicator was fixed at one.

In order to facilitate estimation, the measurement errors of the indicators (theta deltas and theta epsilons) were fixed, with the exception of the latent variables for which there were multiple indicators. It was estimated that physicians' age could be measured with considerable accuracy, and it was initially assumed that a 10% error variance would be a reasonable and conservative estimate. However, upon estimation, it became apparent that this error variance was so high as to imply a correlation of greater than 1.0 among some of the estimates; it was subsequently reduced to 2.5%. The error variance of physicians' education was also thought to be low and was fixed at 5% of the variance of the variable. The theta delta for the physicians' confidence in their ratings was fixed at 20%, since this variable is likely to be measured with less precision. Patient sex was assigned a measurement error of 5%. Patient age, education, and diagnosis can also be measured with considerable accuracy. Hence an estimate that 10% of the variance of the indicator could be attributed to error would be considered to be very conservative. The measurement error variance of the indicators of the physicians' perceptions of the patients' support, health status, and functional status (ability to work) were fixed at 20% since these concepts are somewhat esoteric and are generally considered to be more difficult to measure. Also, the length of experience with the treatment modality was again assigned a measurement error of 20%, since it is possible that patients may have had difficulty recalling the specific month when they began treatment. The measurement errors for the physicians' perceptions of the patients' outlook and their perceptions of QOL on the IWB were fixed at 30% of the variance of the indicator. The variable, patients' perceptions of QOL (on the IWB) was assigned a slightly lower measurement error since it is believed that their perceptions of their QOL would be measured with more accuracy than the physicians' perceptions of the patients' QOL. The measurement errors of one of the indicators of the physicians' perceptions of functional status (ability to perform activities of daily living) and two of the indicators of QOL (TTO and SASS) for both patients and nurses were estimated by leaving the values free to fluctuate above or below an initial start value of 20% error variance. Attempts to free other estimates of error variance resulted in problems with colinearity of estimates; as a result the measurement error variances of these variables remained fixed. Sensitivity analyses were conducted to determine whether fixing the measurement error had any effect on the findings obtained in other parts of the model. Again, there was no evidence to suggest that fixing the measurement quality substantially altered the results.

One other change was required in order to allow for estimation of the model. Some difficulties were encountered in estimating the phi coefficient for the variable, length of experience with the treatment modality. This may have occurred because the scale of the indicator was much different than that of other measures in that the variable had been measured in months. In order to overcome the technical difficulties, the phi coefficient for this variable was fixed at 80% of the variance of the indicator. This is the converse of having fixed the measurement error variance at 20%.

The initial model (as depicted in Figure 5.5) was estimated and is included in Appendix 11. The Chi-square with 107 degrees of freedom was 367.38 (p=.000). Again, this suggests that it is highly unlikely that the differences between the model-and-coefficient implied variance-covariance matrix and the observed data matrix occurred as a result of only sampling fluctuations. That is, the model failed to fit the data, so any report of effects must be viewed with suspicion.

A summary of the LISREL estimates for this model are included in Table 5.2. Again, a number of the hypotheses inherent in the model were not supported; that is, many of the effects were not statistically significant. Of the 24 hypothesized effects, 14 were found to be significant.

Although many of the hypothesized effects were significant, the model of the physicians' perceptions of QOL, as a whole, had numerous problems. Again, the modification indices suggested difficulties with the measurement structure of the variables. There were large modification indices for the lambda Y coefficients. It seemed that the SASS and IWB indicators of QOL could also be seen as indicators of outlook, and that the measures of outlook and functional status could be viewed as indicators of QOL. Also, large modification indices were noted for a number of lambda X coefficients: from patients' perceptions of QOL to treatment modality; from physicians' age to patients' age and diagnosis; from physicians' confidence in their ratings to the patients' ratings of their QOL on the TTO; from patients' sex to patients' age, length of experience with the treatment, diagnosis, and patients' ratings on the SASS and IWB; patients' education to physicians' ratings of the patients' support; patients' age to their ratings on the TTO; treatment modality to patients' ratings on the TTO, physicians' age, education, confidence in rating and patients' sex and education; physicians' perceptions of their patients' support to physicians' age, education, confidence in rating, and patients' sex and education; and diagnosis to patients' ratings on the TTO.

The modification indices for the beta coefficients are modest. However, the indices for the gamma coefficients suggest that several additional paths are possible. These include: patients' perceptions of QOL on physicians' perceptions of health status, physicians' age on their perceptions of the patients' functional status, patients' sex on physicians' perceptions of functional status, patients' education on physicians' perceptions of the patients' outlook, treatment modality directly on physicians' perceptions of the patients' QOL, and physicians' perceptions of patients' support on their perceptions of the patients' QOL.

As well, it was noted that the modification indices for several of the measurement error variances were high. Specifically, there were some problems with the fixed error variances of the patients' treatment modality, the physicians' age, the physicians' ratings of the patients' outlook, QOL on the IWB, and their confidence in their ratings.

Given the high Chi-square and the number of problems with the model, it was apparent that more than a few changes would be required to improve the model. Attempts were made to free several of the lambdas. However, this change in model specification created problems in estimating the model; it would no longer converge.

It was interesting to compare the physicians' model of the patients' QOL with the nurses' model (see Table 5.2). Many of the same effects were noted (i.e., outlook on health, outlook on QOL health on functional status, functional status on QOL, patients' perceptions on health care providers' perceptions, treatment modality on health status, and support on outlook). However, several different effects were noted between the groups. For example, with the physicians, outlook and diagnosis had significant negative effects on functional status; these effects were not significant in the model of the nurses' perceptions. However, because of the problems with the models as a whole, caution must be used in comparing these findings. Nevertheless, it seems that some variables may be predictors of one group's perceptions and other variables may be predictors of another group's perceptions.

A reduced model of the physicians' perceptions was also examined. This model is depicted in Figure 5.6. It is very similar to that described previously for the nurses' perceptions of the patients' QOL. The same measures were used for each of the latent variables. The measurement errors were fixed (with the exception of those for variables with multiple indicators, in which case they were left free to be estimated) at levels that seemed to be appropriate. The measurement errors for the physicians' perceptions of the patients' support, ability to work, and the length of experience with the treatment were fixed at 20% of the variance of the indicators. The theta deltas for diagnosis and treatment modality were fixed at 10% of the variance. The theta epsilons for the physicians' perceptions of the patients' outlook, health status, and QOL on the IWB were fixed at 30% of the variance of the indicators. The measurement errors of the physicians' perceptions of the patients' functional status (ability to perform activities of daily living) and their perceptions of the patients' QOL on the SASS and TTO were left free to be estimated. It was found upon estimation, that 48% of the variance of the ability to perform activities of daily living could

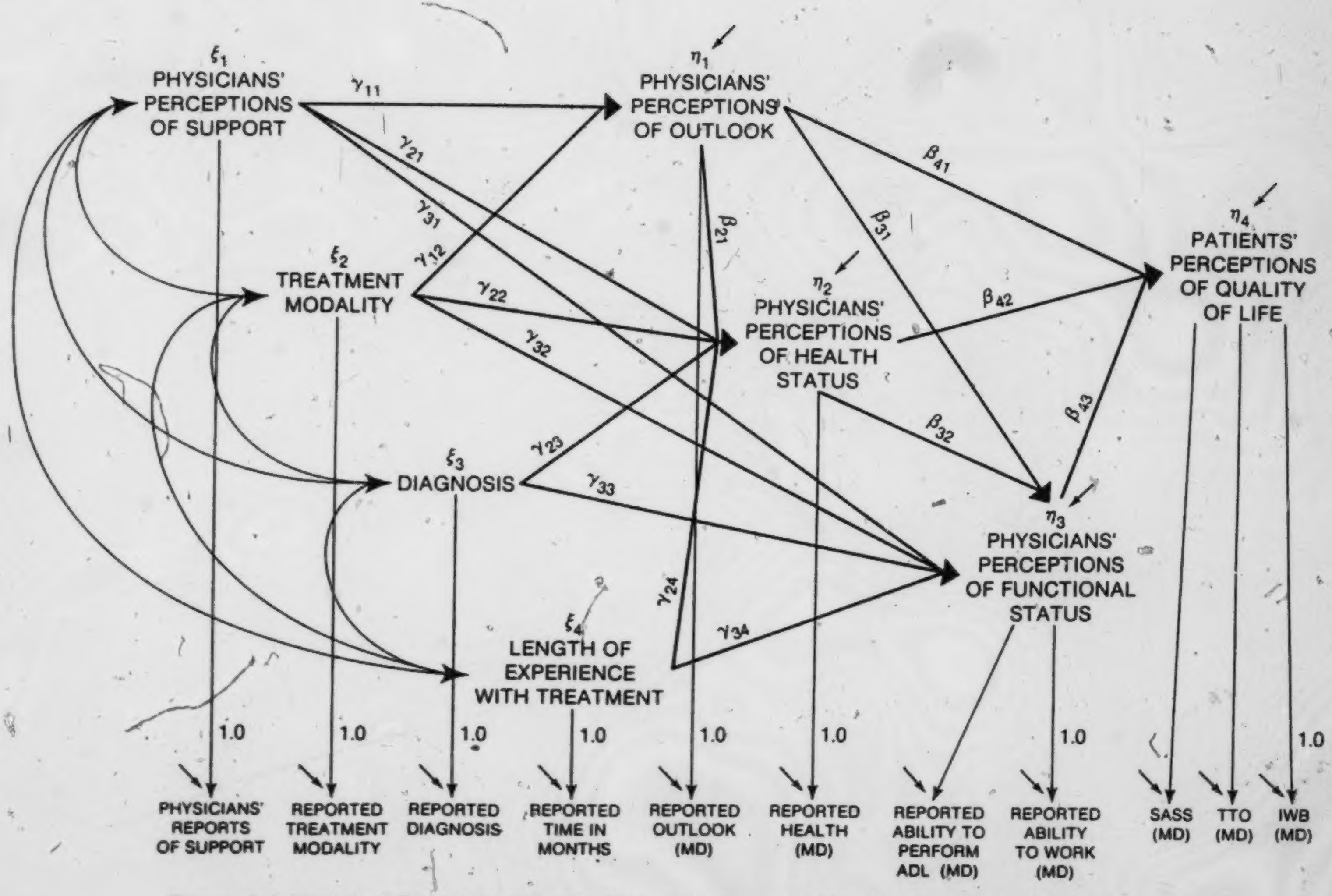

ξ_1
PHYSICIANS' PERCEPTIONS OF SUPPORT
ξ_2
TREATMENT MODALITY
ξ_3
DIAGNOSIS
ξ_4
LENGTH OF EXPERIENCE WITH TREATMENT
η_1
PHYSICIANS' PERCEPTIONS OF OUTLOOK
η_2
PHYSICIANS' PERCEPTIONS OF HEALTH STATUS
η_3
PHYSICIANS' PERCEPTIONS OF FUNCTIONAL STATUS
η_4
PATIENTS' PERCEPTIONS OF QUALITY OF LIFE
γ_{11}
γ_{21}
γ_{31}
γ_{12}
γ_{22}
γ_{32}
γ_{23}
γ_{33}
γ_{24}
γ_{34}
β_{21}
β_{31}
β_{41}
β_{42}
β_{32}
β_{43}
1.0
PHYSICIANS' REPORTS OF SUPPORT
REPORTED TREATMENT MODALITY
REPORTED DIAGNOSIS
REPORTED TIME IN MONTHS
REPORTED OUTLOOK (MD)
REPORTED HEALTH (MD)
REPORTED ABILITY TO PERFORM ADL (MD)
REPORTED ABILITY TO WORK (MD)
SASS (MD)
TTO (MD)
IWB (MD)

Figure 5.6 Model of Physicians' Perceptions of QOL of Patients with ESRD (Reduced)

be explained by the variable, physicians' perceptions of functional status. Also, it was found that the 79.8% of the variance on the SASS and 45.2% of the variance on the TTO could be explained by the concept, physicians' perceptions of the patients' QOL.

Difficulties were encountered in estimating the model, because there was colinearity between the estimates, specifically with the paths relating to the physicians' perceptions of health status, functional status, and quality of life. Also, standardized beta coefficients greater than one were obtained, indicating problems with identification of the model. Sensitivity analyses were done, whereby the paths between the physicians' perceptions of health and functional status were fixed at various levels. It was found that reasonable estimates could be obtained when this parameter was fixed between .4 and .9. For the remaining analyses, this parameter was fixed at .7, so all effects are interpretable as conditional on the assumption of an effect of this magnitude of physicians' perceptions of the patients' health status on their perceptions of the patients' functional status.

The reduced model of the physicians' perceptions of the patients' QOL was also not successful. The Chi-square was 132.57 (df=21, p=.000). Again, there is a very low probability that the differences in the model-and-coefficient implied variance-covariance matrix and the observed data covariance matrix could be due to sampling fluctuations alone. The LISREL estimates for this model are included in Table 5.4. Of 15 possible hypothesized effects, 6 were noted to be significant.

Table 5.4

LISREL Maximum Likelihood Estimates for Reduced Model of Physicians' Perceptions of QOL

Parameter	Physicians
Beta	
Outlook to Health	.594***
Outlook to Functional Status	.145
Outlook to QOL	1.270*
Health to Functional Status	.700 (fixed)
Health to QOL	2.360***
Functional Status to QOL	.305
Gamma	
Treatment to Outlook	-.234***
Treatment to Health	-.392***
Treatment to Functional Status	-.057
Support to Outlook	.548***
Support to Health Status	.223
Support to Functional Status	-.013
Experience with Treatment to Health	.001
Experience with Treatment to Functional Status	-.002
Diagnosis to Health	-.023
Diagnosis to Functional Status	-.165
Lambda Y	
Ability to Perform Activities of Daily Living (Functional Status)	.471***
SASS	.678***
TTO	.075***
Theta Epsilon	
Ability to Perform Activities of Daily Living	.093***
SASS	.481***
TTO	.028***
Proportion of Explained Variance	
Eta 1	.327
Eta 2	.588
Eta 3	.480
Eta 4	.739
Chi square	132.57
df	31
probability	.000

*p<.05
**p<.01
***p<.001

As in the previous models, the modification indices suggested that there were some problems with the measurement structure of the variables. It appeared from the modification indices of the lambda Y coefficients that the IWB could also be viewed as an indicator of outlook. The outlook and the functional status (ability to work) variables appeared to be indicators of the health status variables. Also the outlook, health status, and functional status (ability to work) variables appeared to be very strong indicators of the physicians' perceptions of QOL.

Also, the modification indices suggested possible paths from the quality of life variable to the outlook, health status, and functional status measures. That is, there is a possibility of reciprocal causation. While it seems most reasonable to expect that outlook, health status, and functional status are causally prior to QOL, it is not inconceivable that QOL could also affect these variables. A study using a longitudinal design could help clarify the causal order of the variables.

There is also some evidence in the modification indices that there may be direct effects of treatment modality, physicians' perceptions of support, diagnosis, and length of experience with the treatment on the physicians' perceptions of their QOL. Only indirect effects had been hypothesized. Also, a high modification index was noted for the theta epsilon (error variance) for the measure of physicians' perceptions of patient outlook and a high modification index for the theta delta of the measure of diagnosis.

Several revisions were attempted to improve this model. Many of the noted lambdas were freed; however, this created problems in estimation of the model (i.e., colinearity between the estimates). The only path that could be left free without difficulty was the lambda from QOL to outlook. This change with several adjustments to the fixed measurement structure (i.e., increased error variance of outlook from to 40%; increased error variance of diagnosis to 20%). These revisions resulted in some improvement of the Chi-square; it was reduced to 88.57 (p=.000; df=30). However, the model still failed to fit the data. That is, there were significant differences between the model-implied covariance matrix and the data-implied variance-covariance matrix.

Again the modification indices and partial derivatives suggested numerous problems with the lambda coefficients and the several of the betas (i.e., suggesting reciprocal causation). It appeared that no changes could be made that would substantially improve the fit of the model.

Although the fit of the models with the data was reasonable for the patients' and the "reduced" nurses' data sets, no such fit was found for the model of the physicians' perceptions of QOL. In the multiple regression analyses, difficulties were encountered in finding consistent predictors for the three indicators of QOL. For each of the indicators, a different set of variables was significant (with the exception of support which appeared as a significant predictor for two of the dependent variables). It seems that the the physicians' patterns of responses are different from those of the other two groups.

When the reduced models of the physicians' and nurses' perceptions of the patients' QOL were compared with the model of the patients' perceptions, several similarities and differences were noted. However, the physicians' and nurses' models had so many data-instigated changes that it is impossible to trust the reported effects. In the models of the care providers' perceptions, many more problems were noted with the measurement structures of the variables. The modification indices for the lambdas much higher than in the patient model. It appeared that many of the indicators (e.g., health, functional status, and outlook) could be considered to be indicators of the health care professionals' perceptions of QOL. The health care professionals were not as precise in their separation of the various concepts. Also, it appeared from the modification indices, that many more paths (including some reciprocal effects) were possible in the models of the care providers' perceptions.

Summary

A number of models were proposed to explain the perceptions of patients, nurses, and physicians regarding the quality of life of patients with end stage renal disease. These models were tested using LISREL. The model of the patients' perceptions of QOL was revised, and with some changes was found to be consistent with the observed data covariance matrix. For the nurses' model, numerous data-prompted revisions were required before an even marginal fit was found between the data and the model. Hence, this model's estimates of effects must be viewed with a considerable amount of skepticism. The model of the physicians' perceptions of the QOL of ESRD patients was even worse. It was not possible to obtain a model-implied covariance matrix that corresponded to the physicians' data. Hence the effects in this model are patently untrustworthy. Thus, it must be concluded that the LISREL models cast considerable doubt on the theorizing used in creating the physicians' and nurses' models. This is particularly disconcerting because these findings throw into question the multiple regression analyses done for the doctors and nurses since no overall model test or comparable model diagnostics are available in the multiple regression analyses.

That is, the failure of the physicians' model and the borderline failure/success of the heavily modified nurses' model implies that there is considerable doubt about the overall conceptualization that has been used, including that used in the multiple regression analyses. Hence, the lack of an overall test of the model in multiple regression leaves one to wonder about the veracity of the theory underlying the effects reported in the multiple regression analyses reported earlier.

VI. DISCUSSION AND LIMITATIONS

Conceptualization and Measurement of Quality of Life

Quality of life has been conceptualized and measured in many different ways. For this study, it was conceptualized as being global and unidimensional. That is, QOL was seen as reflecting an assessment of life overall, on a continuum or scale from very low to very high. This approach can be contrasted with a more particular multidimensional approach, in which a number of different facets or dimensions of life are rated. These dimensions could include such things as marital life, ability to work, job satisfaction, health status, functional status, self-esteem, etc. Researchers who use multidimensional definitions of QOL frequently and mistakenly attempt to sum or otherwise aggregate the scores on the various dimensions. If QOL is indeed multidimensional, then its various dimensions cannot be meaningfully summed. It is the belief of this researcher that these "dimensions of QOL" should be considered to be possible predictors of QOL. That is, variables such as ability to work, employment status, and health status have an effect on an individual's QOL. They are not part of QOL per se.

A strength of this study is that QOL has been conceptualized as a global unidimensional concept, and that possible explanatory variables have been examined. The indicators of QOL that were selected have not only been previously tested for reliability and validity, but they also seem to be very good indicators of the overall (unidimensional) concept of QOL.

Reliability and Validity of Measures

Information regarding the reliability and validity of measurement is necessary for the interpretation of any findings. In this study, attempts were made to examine the measurement structure of the three dependent measures.

Test-retest correlations were examined for the ratings of 20 patients and their physicians and nurses after a six week tme lapse. The stability reliability of the measures was acceptable for the Self-Anchoring Striving Scale and the trade off point (r=.79 and .85 respectively). However, the stability reliability was lower for various items on the Index of Well-Being. For instance, a correlation of .04 was obtained between responses obtained on the first administration of the questionnaire and responses obtained on the retest on the item pertaining to how enjoyable a person found his/her life to be. Also, relatively low stability reliability scores were obtained on the items pertaining to whether life was easy or hard, and full or empty. Also, the overall life satisfaction item did not prove to be stable (r=.15).

Zeller and Carmines (1980) caution that a low test-retest correlation "may not be an indication that the reliability of the measure is low but may, instead, signify that the theoretical concept itself has changed" (p.52). Although the patients were not retested if there were obvious changes in the patient's health and/or personal status, it is indeed possible that perceptions regarding various aspects of their lives had changed between administrations of the questionnaires. It may also be that measures of stability reliability are not appropriate for measures of quality of life, since quality of life does not necessarily remain static.

Campbell et al. (1976) reported that the stability correlation for the life satisfaction measure after a lapse of eight months was .43. They were able to demonstrate that some true change was involved for some respondents between interviews. Campbell et al.'s (1976) ten semantic differential items also demonstrated stability correlations that fell into the same range as the life satisfaction measure. It was disconcerting to note that some of these correlations, after a considerably longer time period, were higher than the test-retest correlations obtained in this study. However, it may be that more changes or greater changes occur in the lives of individuals with renal failure.

It was also noted that the stability reliability of most items in the Index of Well-Being was higher for the physicians' and nurses' ratings than for the patients' ratings. It may be that nurses and physicians are not familiar with all the changes and nuances within the lives of their patients, and hence rate the patients' quality of life more consistently.

The items in Spitzer's QL Index were used as independent variables, or predictors of quality of life. All but one of the items contained in this index (i.e., health status) had low test-retest correlations. The measures of functional status and outlook, in particular, had low test-retest correlations. Again, it is difficult to determine whether these low correlations occurred as a result of changes in life circumstances or whether they should be attributed to measurement error.

The internal consistency of the Index of Well-Being was fairly high, with an alpha coefficient of .91 for both the total index (11 items) and the reduced index (9 items). Campbell et al. (1976) found that two adjective pairs, namely "easy vs. hard" and "free vs. tied down" did not seem to "fit as tightly within the same cluster" (p. 39) as did the other adjective pairs. In this study, somewhat lower correlation coefficients were also found between these items and the other adjective pairs. However, the patterns were not as notable as those found by Campbell et al. It may be that in patients with renal failure, perceptions of whether life is easy or hard and free or tied down are more relevant to the perceptions of quality of life. Individuals with renal failure are likely to feel tied down and may find life more difficult than the average healthy person by virtue of their condition, its treatment, and the limitations placed upon them. Nevertheless, for the purposes of this study, the nine item index was used, primarily to be consistent with other researchers and to facilitate comparison of these findings with those of Campbell et al. (1976) and Evans et al. (1985).

Concurrent validity is established by comparing the measure of interest with some other measure designed for the same purpose. In this study, three measures of quality of life were compared. It is recognized, however, that there is no gold standard for the measurement of quality of life, and that it may be difficult to determine which of the instruments, if any, is valid. The correlation matrix of the dependent measures of quality of life (namely the Self Anchoring Striving Scale, the Health State Utility Score and the Index of Well-Being) was examined. As previously reported (see Figure 4.7), the intercorrelations ranged from .44 to .65. These correlations are difficult to interpret. If they were considerably lower than .5, one could conclude that the items were measuring different concepts. If they were considerably greater than .5, one could conclude that (given some measurement error) the same concept was being measured. The middle range of these correlations implies that the three instruments are probably measuring the same thing, but that the instruments are tapping different facets of quality of life. It would appear that the Time Trade-Off Health State Utility Score is somewhat different from the other measures of quality of life, in that it focuses on health state predominantly, and it requires a cognitive process that is different from that required for the other measures.

The ability of an instrument to discriminate is an important test of its validity. In an attempt to examine the discriminant validity of the measures, it was predicted a priori that transplant patients would have higher quality of life scores than dialysis patients, and that incenter dialysis patients would have lower quality of life scores than CAPD and home hemodialysis patients. This prediction was supported by the findings of Churchill et al. (1984) and Evans et al. (1985) in their studies of patients with end stage renal disease. If it is assumed that this proposition is true, it would appear that the Time-Trade Off measure had the greatest discriminant validity. On this measure, transplant patients had the highest quality of life ($\bar{X}$=.76), followed by home hemodialysis, CAPD, and finally, incenter hemodialysis patients ($\bar{X}$=.61, .53, .39 respectively; see Table 4.8). On the other measures, namely the Self Anchoring Striving Scale and the Index of Well-being, the transplant patients reported a higher quality of life than the dialysis patients, but differences between the types of dialysis treatments did not persist. Since these instruments have demonstrated the ability to discriminate in other studies, one must consider whether the problem lies with a lack of validity or whether it pertains to particular characteristics of the sample under study. The latter seems more likely. Simmons et al. (1984) also made similar observations. They reported that transplant patients scored significantly higher than either CAPD or hemodialysis patients on all measures of emotional well-being, and that on the Index of

Well-Being, scores of CAPD patients were not significantly different from those of hemodialysis patients.

The ability to discriminate between quality of life of dialysis and transplant recipients was evident for all the measures of quality of life. However, it is not clear whether the instruments are unable to discriminate between the quality of life of patients receiving various dialysis treatment modalities or whether there are relatively few differences in the quality of life of the CAPD, home hemodialysis, and incenter hemodialysis patients in this study. Nurses working with the CAPD and home hemodialysis patients indicated that they had concerns that the quality of life of their patients was not as high as it had been in previous years. They suggested that the patients were older and sicker. However, data are not available to substantiate this hypothesis. Although data from earlier years are not available, in this study, age was not found to be a significant predictor of patients' perceptions of quality of life. As well, the ages of the patients in all the dialysis treatment groups were very similar (see Table 4.1). Health status was a more significant predictor of QOL. However, the incenter hemodialysis patients' ratings of their health status ($\bar{X}$-1.19) were somewhat lower than the home hemodialysis ($\bar{X}$-1.27) and CAPD ($\bar{X}$-1.27) patients' ratings, as might expect if one assumed that the original proposition was true.

Although the measures of quality of life used in this study are some of the best that are currently available, there is evidence that there is considerable error in measurement of the concept when these indicators are used. For example, in the LISREL model of the patients' perceptions of QOL, the measurement error of the Self-Anchoring Striving Scale was found to be 46.5% of the variance of the indicator and the measurement error of the Time Trade Off measure was 48%. In the model of the nurses' perceptions, the error variance of the SASS was estimated to be somewhat lower at 38.7%, but the TTO was found to have an error variance of 80%. The estimated error variances obtained for these variables were lower in the model of the physicians' perceptions (20% and 54% on the SASS and TTO respectively) but these estimates cannot be considered to be trustworthy. Considerable work is still required to develop measures of QOL that have lower measurement error variances. It appears that the Time Trade Off measure, in particular, is somewhat different from the other measures of quality of life. Not only does it focus more on health-related quality of life than do the other measures, but it involves a process of reflecting on and evaluating one's life that is very different from that used in the other instruments. Several patients actually refused to participate in this aspect of the interview. A few patients found the concept of the trade-off difficult to understand and a few found the concept objectionable. Other patients who completed the instrument indicated that they had never thought about their life and quality of life in quite that way (but of course this is not a requirement for measurement of QOL).

It also appeared from the findings of the regression analyses, that less variance was explained for the TTO than for the other measures of QOL. In the LISREL analyses, it was noted that a slightly better fit was found between the model and the data when the TTO measure was examined separately from the other two indicators of QOL (SASS, IWB). However, the concept, QOL, was found to explain a substantial proportion of the variance of all three indicators. There was not enough evidence to suggest that the TTO was measuring a different concept than the SASS and IWB. Many of the same independent variables were significant predictors of QOL for the TTO, the IWB and the SASS on the regression analyses. Using LISREL, many of the same paths were found to be significant when one compared the two indicators (SASS, IWB) and one indicator (TTO) models. This too suggests that the instruments are likely measuring the same concept, but that the TTO may be tapping somewhat different facets of the concept. Levine (1987) emphasized the importance of distinguishing between "quality-of-life aspects which are health-related from the quality of life which resides in the basic social conditions of our larger world" (p. 4). The Index of Well-Being and the Self-Anchoring Striving Scale probably fall into the latter category, while the Time Trade-Off focuses largely on health-related quality of life.

Many authors have listed criteria for the measurement of quality of life. All of these criteria include the establishment of reliability and validity. This study has provided considerable information regarding the reliability and validity of not only one, but three measures of quality of life. Other criteria for utility of a quality of life instrument include: ease of administration, low cost of administration, acceptability to patients, ease of interpretation, particularly to health care professionals, amenity to statistical analysis (Churchill, et al., 1987), ability to quantify findings (Alexander & Willems, 1981), and provision of subjective, rather than objective assessments of quality of life (Gill, 1984). All of these instruments, in general, meet these criteria. The Time Trade-Off measure is probably the most costly to administer because it requires use of an interviewer or research assistant, whereas the other instruments can be self- administered. As well, the Time Trade-Off was probably the most difficult instrument for the subjects to comprehend, and the questions often required repetition. All the instruments provided quantitative estimates of quality of life and all were used with various statistical procedures.

The major problem affecting the measurement of quality of life has not been addressed in this study. That is, there is no consistent definition or conceptualization of the concept. Until the philosophical and theoretical thinking required to develop an appropriate definition has been completed, it may not be realistic to expect that the measures of quality of life will demonstrate a high degree of validity. Since there are no widely accepted measures of quality of life and no gold standards for measurement of the concept, estimations of reliability and validity will remain crude attempts to measure what has not as yet been adequately defined.

Patients' Perceptions of Quality of Life

Many similarities were found between the patients' reports of their quality of life and reports found in the literature. Jackle (1974) used Cantril's Self-Anchoring Striving Scale to study the quality of life of incenter hemodialysis patients. The subjects in her study rated their quality of life at 5.5 on the ladder (ranging from 1 to 10). In this study, the mean score of the incenter hemodialysis patients was 5.65 on the same scale. In a general American population, the mean score was 6.6. Since one would expect that the quality of life of hemodialysis patients is somewhat lower than that of a population of normal subjects, the findings of this study (and those of Jackle) seem reasonable and appropriate. However, contradictory findings were reported by Laborde and Powers (1980) who found that the hemodialysis patients rated their quality of life as 7.2 on the ladder.

Churchill et al. (1987) used the Time Trade-Off to examine the quality of life of patients with end-stage renal disease. Their findings were also similar to the findings of this study in that transplant patients reported the highest mean quality of life on the measure, followed by home dialysis, and incenter hemodialysis patients (see Table 4.8). In this study, slightly lower mean ratings of quality of life were obtained for the transplant, incenter hemodialysis, and CAPD groups, and slightly higher mean ratings were obtained for the home hemodialysis group.

Evans et al. (1985) used the Index of Well-Being to examine the quality of life of patients with ESRD. In Evans' study, the mean quality of life scores, for all treatment groups, were higher than those obtained in this study. The mean quality of life score of transplant patients on the Index of Well-Being was 11.83 in Evans' study, as compared to 11.29 in this study. The mean score of incenter hemodialysis patients was 10.77 in Evans' study and 7.04 in this study. It is possible that there was a very different case mix of patients in this center; however, it is evident from the demographic characteristics that the dialysis patients in this study were not older than those in Evans' sample. Furthermore, it is surprising that the transplant patients in Evans' study reported slightly higher scores on the Index than did patients in a normal population ($\bar{X}$=11.77; see Campbell et al., 1976). This may lead one to query the validity of these findings. Nevertheless, it is somewhat disconcerting that a group of Canadian dialysis patients consider their quality of life to be much lower than a comparable group (purportedly) of American dialysis patients.

For the most part, past attempts to explain the quality of life of patients with end stage renal disease have focused on treatment modality as the major explanatory variable. In this study, other possible explanatory variables were examined as possible predictors of quality of life. Treatment modality, patient outlook, and health status were the major predictors of quality of life. As would be expected, patients who had been transplanted, patients with a positive outlook, and patients with a higher perceived health status tended to have a higher quality of life.

Many other variables, such as age, sex, diagnosis, and education were not significant predictors of quality of life. One might expect that the very old and very young patients have a lower quality of life. Such a curvilinear relationship was not found. Also, there is considerable concern regarding the quality of life of diabetic patients. However, diabetes was not a significant predictor of patients' perceptions of quality of life in this study. Also, education (which is often used to reflect socioeconomic status) was not a predictor of patients' perceptions. It was expected that support would be a significant predictor of quality of life, but it appeared as a significant predictor only for the Index of Well-Being ($p<.01$). Marital status (which is sometimes used as an indicator of support) was a significant predictor of quality of life on the Time Trade-Off.

The LISREL model helped to clarify the effects of some of the predictors on QOL. For instance, it was found that health status had an indirect effect (through functional status) rather than a direct effect on QOL. Similarly, support had an indirect effect on QOL through outlook and health status. Treatment modality had both direct and indirect effects on QOL. It was also interesting to note that health status and outlook had effects on the patients' reports of QOL. That is, not only did health status and outlook have effects on the concept, QOL, they seemed to have direct effects on the patients' ratings on the SASS and IWB measures.

It was noted that nurses' and physicians' perceptions of the patients' QOL were significant predictors of the patients' perceptions on the SASS, even when other variables were controlled. The nurses' perceptions were also significant predictors of the patients' perceptions on the IWB. It seems that to some extent, the health care providers' perceptions may have influenced the perceptions of their patients. It might be expected that the magnitude of these effects would be larger, and that the effects of the care providers' perceptions would be evident on each of the three dependent variables. However, this finding is consistent with the finding that the relationship between the patients' perceptions and the care providers' perceptions is not strong, and that the correlations between patients' and care providers' ratings are highest on the SASS (see Table 4.15).

Two of the predictors of quality of life, namely outlook and functional status, are worthy of further comment. It may appear that the relationship between outlook and quality of life is somewhat tautological. That is, one would expect that people with a positive outlook would perceive their quality of life to be high. Similarly, people with a good quality of life are also likely to have positive outlooks. However, there may be more to the relationships than these statements imply. Antonovsky (1979) describes the concept, "sense of coherence" as "a global orientation that expresses the extent to which one has a pervasive, enduring though dynamic feeling of confidence that one's internal and external environments are predictable and that there is a high probability that things will work out as well as can reasonably be expected" (p. 184). He hypothesizes that this sense of coherence mediates the effects of stressors on health. Similarly Spitzer et al. (1981) describe the highest rating on the outlook dimension as "...appearing calm and positive in outlook, accepting and in control of personal circumstances". These definitions are very similar. The implication of control arises in both definitions as well as the idea of positive attitude. It may be that the outlook measure is really a measure of a concept anolagous to the "sense of coherence".

Two measures of functional status were used in the study. The highest rating on the first measure indicated that the individual was "working or studying full time...or managing own household or participating in unpaid voluntary activities...". The highest rating on the second measure of functional status indicated that the individual "has been self-reliant in eating, washing, toileting, and dressing, using public transport" (ibid, p. 591). The correlation between the two measures was .44. It appears from both the substantive meaning of the items and the correlations, that the items may be measuring different concepts. The LISREL analyses also support this hypothesis. Although the lambda from functional status to "activities of daily living" was statistically significant, it was noted that the estimate of measurement error was very large. For future studies, it may be more appropriate to label the first measure as "occupational activity", and the second measure as "activities of daily living", and treat them as separate concepts.

The first measure of functional status (or occupational activity) was a significant predictor of patients' perceptions of QOL on one measure, nurses' perceptions of QOL on two measures, and physicians' ratings of QOL on one measure. Because this variable arises frequently as a predictor of quality of life for both patients and care providers, it is necessary that the impact of productive or work-related activity be considered.

Caregivers' Perceptions of Quality of Life

Very few attempts have been made to examine the caregivers' perceptions of their patients' quality of life. It was expected that the characteristics of the caregivers would be major predictors of their perceptions of the quality of life of their patients. However, it was found that the caregivers' characteristics explained very little of the variance of their perceptions of their patients' quality of life. However, it appeared that the nurses' perceptions of the patients' characteristics were much better predictors of their ratings than were their own characteristics. Patients' education was a significant predictor of quality of life on all three measures. It was interesting that the nurses perceived that patients with higher education had a higher quality of life. This suggests that nurses' perceptions may be influenced by the socioeconomic status of their patients. As well, on the Time Trade-Off, patient sex and diagnosis were significant predictors of quality of life with male patients and diabetics rated as having a lower quality of life. Also, on two of the three measures, the nurses' perceptions of the patients' outlook were a significant predictor of quality of life. That is, the nurses who believed that patients viewed their lives in a positive manner rated their quality of life positively.

It was interesting to note that the predictors of the nurses' perceptions were very different from those of the patients' perceptions. For nurses, the sociodemographic characteristics were significant predictors, whereas with the patients, they were not. It was surprising to find that treatment modality was not a significant predictor of the nurses' ratings of quality of life, whereas this variable was highly significant to the patients. This leads one to wonder whether nurses' perceptions are based upon inappropriate categorizations of which types of patients do poorly or do well. For instance, nurses may assume that older and better educated patients do better, or that women have less difficulty adjusting to treatment than men. In clinical settings, it is not uncommon to hear nurses making these types of generalizations. However, nurses' ratings of patients' health status, functional status, and outlook were also significant predictors of their ratings of quality of life. The significance of these factors suggests that some consideration is also given to the patients' individual situations.

Different predictors of physicians' perceptions of the patients' quality of life were found for each of the dependent variables. With the exception of support, which was a significant predictor for two of the measures, other variables (i.e., physicians' perceptions of patients' health, functional status, outlook, patients' sex, treatment modality, physicians' education, and experience in occupational role) appeared as significant predictors for only one of the dependent measures. It is not clear why the patterns of prediction were not similar for the dependent measures. Although the measures may be tapping slightly different aspects of the concept, it was expected that a pattern of relationships would become evident, as it did for the nurses' and patients' perceptions.

Patients' perceptions were significant predictors of the health care providers' perceptions of the patients' QOL on the SASS, but not on the other dependent measures. Again, it might be expected that the patients' perceptions would have had a greater effect (on all three dependent variables) on their care providers' perceptions. However, when other variables were controlled, the patients' perceptions had only a small effect on the care providers' perceptions of the patients' QOL. Although this effect was statistically significant for the SASS, it is unlikely that it is of any clinical significance, since the magnitude of the effect is relatively low. These findings are consistent with the relatively low observed correlation between patients' and care providers' ratings of the patients' QOL.

The findings obtained in the multiple regression analyses need to be questioned, because of the difficulties encountered in the LISREL analyses of the health care professionals' perceptions. The failure of the model of the physicians' perceptions and the borderline failure of the heavily modified model of the nurses' perceptions imply that there is considerable doubt about the overall conceptualizations. Although there was considerable evidence of measurement error, this error was accounted for in the model. The problems with the models probably pertain more to the specification of the effects within the models themselves. It may be that a different set of predictors is required to explain the perceptions of health care providers regarding the QOL of their patients.

Differences in Perceptions between Patients and Care Providers

It was interesting to note that the differences in mean scores of the patients and care providers were not that great, even though some were statistically significant. The clinical effect of the differences could certainly be questioned. However, it is notable that there were only moderate correlations physicians' and patients' ratings and nurses' and patients' ratings of quality of life. Although there is statistical evidence for a significant relationship between the pairs of ratings, the magnitude of the relationship is not as large as one might expect. The differences are not systematic (i.e., not in one direction or the other). That is, the physicians' ratings were not consistently lower or higher than the patients' ratings, although physicians' mean scores tended to be higher than the patients' mean scores (on all measures except the Time Trade Off). Similarly, there was only a moderate relationship between physicians' and nurses' ratings. On the basis of these findings, it is important to emphasize that similar mean scores do not imply congruence of perceptions.

It was anticipated that there would be differences in the perceptions of patients and their caregivers. However, it was expected that nurses' perceptions of the patients' quality of life would be closer to those of the patients than the physicians' perceptions because nurses spend more time with the patients and have greater opportunities to get to know the patients. This was not the case in this study. There were greater mean differences and lower correlations of nurses' scores with patients' scores than with physicians' and patients' scores. It appears that the physicians' understanding of the patients' quality of life was somewhat closer to the patients' perception than was the nurses' perception. All the physicians who participated in the study were nephrologists (subspecialists in internal medicine). Many of them had worked with their patients for many years. Although the nurses practiced primary nursing, and cared for a caseload of patients over an extended period of time, the turnover of nurses was greater and it is likely that many of the nurses did not know their patients as well or for as long as did the physicians.

Differences in the mean scores of the physicians and the nurses were even larger than the differences between the patients and the caregivers. The correlations of nurses' and physicians' ratings of the patients' quality of life were statistically significant, but again, moderate in magnitude (refer again to Table 4.15). In light of these findings, there should be some concern regarding the effectiveness of communication between physicians and nurses, as well as concern regarding the communication between patients and their caregivers.

Attempts to explain the discrepancies in perceptions between the groups were not very successful. Several methodologies were used (refer to Chapter IV). Using difference scores as the dependent variable, no consistent pattern of predictors was found. Since the absolute magnitude of the difference scores was small, and since a significant proportion of the variance of the perceptions of each group had been explained, the unexplained difference could be attributed to random error. It is also possible that another set of factors would explain differences in perceptions better than did the variables used in this study.

However, it is not clear what variables could explain discrepancies in perceptions. Very little theory is available in this area. Using role theory, one could predict that perceptions of patients, nurses, and physicians would differ. However, social roles are only one factor affecting perceptions. Cognitive dissonance is the classical theoretical formulation relating to differences in perceptions. However, using this theory, one would expect that perceptions would be similar. Further work, of a theoretical and inductive nature, would facilitate the process of explaining differences in perceptions between groups.

Limitations

The findings of this study are not readily generalizable because convenience sampling techniques were used. The sample is not necessarily representative of any other ESRD patient population. However, random sampling techniques are virtually impossible to use in health care settings. The sample size of the physician group was particularly small, and the number of nurses participating in the study was also limited. Hence, these findings are not generalizable.

This study is also limited because a longitudinal design was not used. Hence, it was difficult to examine the data for evidence of reciprocal relationships (e.g., care providers perceptions on patients' perceptions and vice versa) and time sequencing of variables. Also a longitudinal design would facilitate the study of the reliability and validity of instruments. It would be possible to determine whether the measures are stable over time and subject to transient mood changes of the individual.

The findings and conclusions are limited by the availability of data. Although there may be other predictors of patients' or care providers' perceptions of quality of life, analysis was necessarily limited to those variables for which data were collected. It may have been interesting to explore the effects of such variables as job satisfaction, income, communication patterns, and expectations of quality of life.

It may also have been of benefit to use other measures of some of the independent variables. In retrospect, it appears that there may be better measures of concepts such as support, health, and functional status. However, again, analysis was limited by the data available.

Because the instruments used to measure the dependent variable (quality of life) were brief and relatively superficial, it was impossible to comprehensively describe the quality of life of these patients. However the purpose of the study was not to provide a thorough description of the QOL of these individuals, but to examine and explain the perceptions of three groups, and to explain differences in perceptions between the groups. A more comprehensive inventory of QOL may be useful so that one can identify how and why perceptions of physicians, nurses, and patients differ.

The study is limited to some extent by the missing data from nurses or physicians (refer to p. 61). In some cases, the care providers did not believe that they knew the patient well enough to assess their quality of life, or they felt that they could not respond to particular items. Also, it became difficult to elicit full cooperation of some of the care providers in completion of the instruments. In a number of cases, after repeated attempts to obtain the required data, sufficient time had elapsed since the patients had completed the instrument that it was decided to treat the gaps as missing data. In a study such as this, where a limited number of care providers are responsible for the care of a larger group of patients, the expectation that questionnaires pertaining to a number of patients be completed can become quite onerous. In future studies, it would be advisable to sample a population in which a greater number of care providers are involved. Such a plan would also obviate any concerns regarding the limited variance of variables pertaining to the characteristics of care providers.

Also, the study is limited because the measures of QOL were not administered to patients, nurses, and physicians at precisely the same time. Although attempts were made to elicit the participation of the nurses and the physicians as soon as possible after interviews with the patients, it is possible that changes in patient condition, mood, and QOL may have occurred in the interim. From a pragmatic perspective, however, it may be very difficult to have care providers complete the measures at the same time as the patients. Furthermore, the effect of time on QOL measurement is not known.

Summary

In this chapter, the findings of the study were discussed. As well, a number of limitations that preclude generalization of the study were identified. These include: a lack of representative sampling techniques; use of a cross-sectional rather than longitudinal design; availability of data on a limited number of variables; an inability to comprehensively explain or describe QOL because of the brief limited nature of the instruments used; and a time lapse between the time of patients' and caregivers' responses.

VII. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

To conclude, the findings of the study are reviewed in the following paragraphs. Several conclusions are drawn and recommendations for future study are made.

Summary of Findings

The findings of the study are reviewed in the order of the research questions. The first question pertained to the reliability and validity of the measures of quality of life. Test-retest reliability of the measures was checked on a subset (n=20) of the total sample. The correlations for patients ranged from .42 on the Index of Well-Being to .85 on the Time Trade Off. The consistency reliability of the Index of Well-Being was relatively high (alpha of .91).

There was some evidence for concurrent validity of the measures of QOL with correlations from .44 to .65 between the instruments. There was some evidence for discriminant validity, in that transplant patients, as expected, rated their QOL significantly higher than did the dialysis patients.

Mean scores of patients and nurses were compared using Hotellings' t-square and paired t-tests for differences between means. Nurses' rating of patients' QOL were lower than patients' scores on the Time Trade Off and Overall Life Satisfaction measure.

The correlations between nurses' and patients' ratings on the various measures ranged from a low of .19 on the Time Trade off to .47 on the Self-Anchoring Striving Scale.

Patients' ratings on the Self-Anchoring Striving Scale were significantly lower than the physicians' ratings. However, on the other measures of QOL, mean scores of patients and physicians did not differ significantly. However the correlations between physicians' and patients' ratings were moderately low, ranging from .26 to .45.

Nurses' perceptions also differed statistically from physicians' ratings on all measures except the Index of General Affect. Overall, nurses' ratings were lower than those of the physicians, even when differences were not statistically significant. Correlations between nurses' and physicians' scores ranged from .35 on the Time Trade Off to .49 on the Index of Well-Being.

Regression equations were used to explain the patients' perceptions of QOL. Using a series of independent variables, approximately 50% of the variance of QOL was explained on each of the dependent measures. The most significant predictors of the patients' perceptions of their QOL were outlook, treatment, and health status.

Another set of regression equations were used to examine the effect of the health care providers' perceptions on the patients' perceptions of their QOL. The physicians' and nurses' perceptions were significant predictors of the patients' perceptions of QOL on the SASS. Nurses' perceptions of QOL were also significant predictors of patients' QOL on the IWB.

Another series of regression equations (one for each dependent variable) were examined to explain the nurses' perceptions of the patients' QOL. The variables that were the most significant and consistent predictors of the nurses' perceptions were the patients' education, the nurses' education, and the nurses' perceptions of the patients' functional status and outlook.

The physicians' perceptions of quality of life of the ESRD patients were examined. Different predictors explained each of the equations; that is, each of the dependent measures of quality of life had different predictors. The physicians' perceptions of support was a significant predictor of QOL on two of the measures.

An attempt was made to explain differences in perceptions of patients and nurses, patients and physicians, and nurses and physicians. No consistent pattern of predictors was found.

A series of models explaining patients', nurses', and physicians' perceptions of QOL were tested using LISREL. The model of the patients' perceptions of QOL was revised, and with some changes was found to be consistent with the observed data covariance matrix. For the nurses' model, numerous data-prompted revisions were required before an even marginal fit was found between the data and the model. It was not possible to obtain a model-implied covariance matrix that corresponded to the physicians' model.

Conclusions

Although the findings of the study are not readily generalizable to any other population, a number of conclusions were drawn from the observations. Firstly, considerable work is required to develop instruments that reliably and validly measure quality of life. Although the instruments used to measure the concept are some of the best tested and respected measures available, there was considerable evidence of measurement error. It appears unlikely that measurement of quality of life will improve without philosophical and theoretical advances in the area.

It was also concluded on the basis of the findings that the perceptions of the patients, the physicians, and the nurses regarding the quality of life of the ESRD patients in this sample did differ. It also appeared that the patients' perceptions could be explained by a number of predictor variables. From the LISREL models of the nurses' and physicians' perceptions, it seemed that a reconceptualization of those models was required.

Recommendations for Future Study

It is recommended that the study be replicated with other samples of ESRD patients, and other patient populations. It may be that the findings of this study are unique to this sample or to chronic renal failure patients. It would also be interesting to compare the QOL of patients prior to the initiation of dialysis therapy or the QOL of patients who have decided to withdraw from dialysis treatment with those presently receiving treatment.

It may also be advantageous to plan to use a sample where a greater number of care providers are involved in the care of the patients. This would ensure that the data collection process was less onerous for the care providers. However, such an approach might also require more travel and more coordination between the investigator and the care providers.

It is recommended that a longitudinal design be used in future studies. This type of design could clarify time sequencing of variables, reciprocal relationships, and reliability and validity of the measures.

Furthermore, it is recommended that, in future studies, comprehensive inventories of quality of life be used to describe and compare perceptions of quality of life of the various groups. Also, it would be useful to use other, preferably multi-dimensional, measures of social support, outlook, health status, and functional status to help validate the measures used in this study.

While further work needs to be done to develop reliable and valid measures of quality of life, numerous researchers have attempted to do just that. However, success has been limited. It seems that the term quality of life is not well understood. Further philosophical and theoretical investigation would probably contribute more to the measurement of quality of life than volumes of research findings. However, it would be inappropriate to suggest that quality of life research halt until this work has been done. It may be that the findings of some researcher may spur the development of new thinking in the area of quality of life. Further analyses using LISREL to model means (as well as the variances/covariances) may clarify the effects hypothesized earlier, particularly in the models of nurses' and physicians' perceptions. Furthermore, it would be valuable to include other predictors of quality of life in any future study (e.g., socioeconomic status, job satisfaction, expectations, etc.).

It may be interesting to use other methods to study perceptions of QOL. For instance, vignettes may provide standardized examples of QOL of patient populations, that both patients and care providers could examine and rate.

The models of the physicians' and nurses' perceptions of QOL of patients with ESRD need some reconceptualization. Little theoretical work has addressed the perceptions of health care providers regarding QOL of their patients. Additional factors and models that explain these perceptions need to be addressed. Interaction and communication between patients and care providers may affect perceptions of care providers. Also, expectations of QOL may influence ratings of QOL. Variables such as these should be included in future models.

It would also be valuable to compare the perceptions of family members with those of patients and care providers. Family members are important sources of social support for patients with ESRD. Their perceptions may also greatly influence those of the patients.

The objectives of this study did not encompass an examination of the outcomes of discrepancies in perceptions between patients and care providers. However, it is very possible that there may be deleterious consequences of differing perceptions of quality of life. Using a longitudinal design incorporating a number of patient-related and environmental measures, it may be possible to explore the effects of a lack of congruence between patients and care providers.

Summary

This study has generated numerous suggestions for future research. The issues of conceptualizing, measuring, and explaining QOL are very significant. However, research such as this is important not only from a methodological perspective, but also because of the clinical, social, and economic implications. The issues relating to quality of life of ESRD patients are increasingly being considered with respect to such pragmatic considerations as selection of treatment modalities, cost-benefits to society and allocation of resources. It is important that we identify how best to describe the QOL of patients to members of society and government representatives so that appropriate decisions regarding resource allocation can be made.

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Churchill, D.N., Torrance, G.W., Taylor, D.W., Barnes, D.C., Ludwin, D., Shimizu, A., & Smith, E.K.M. (1987). The measurement of quality of life in end-stage renal disease: The time trade-off approach. Clinical and Investigative Medicine, 10(1), 14-20.

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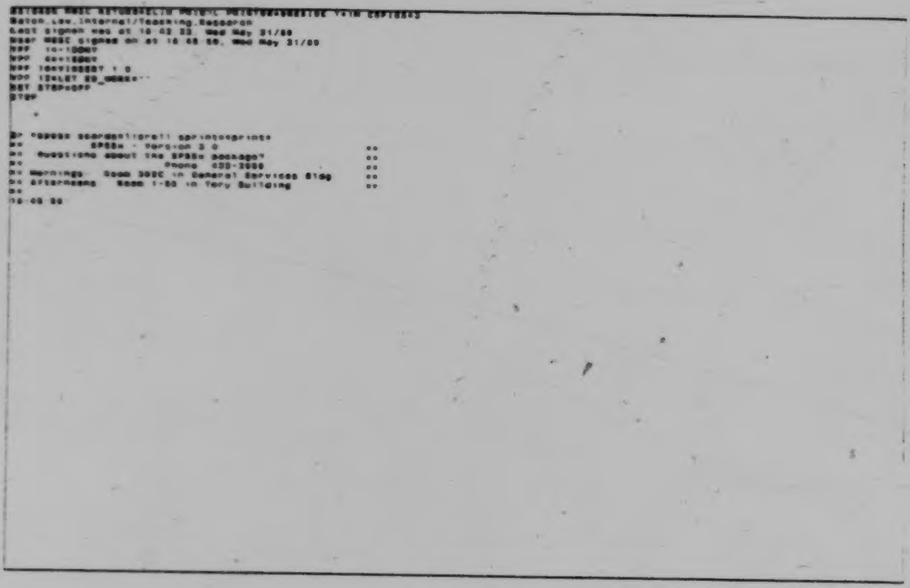
Appendix 5. Correlation Matrix: Items in Index of Well-Being (Nurses' Reports)

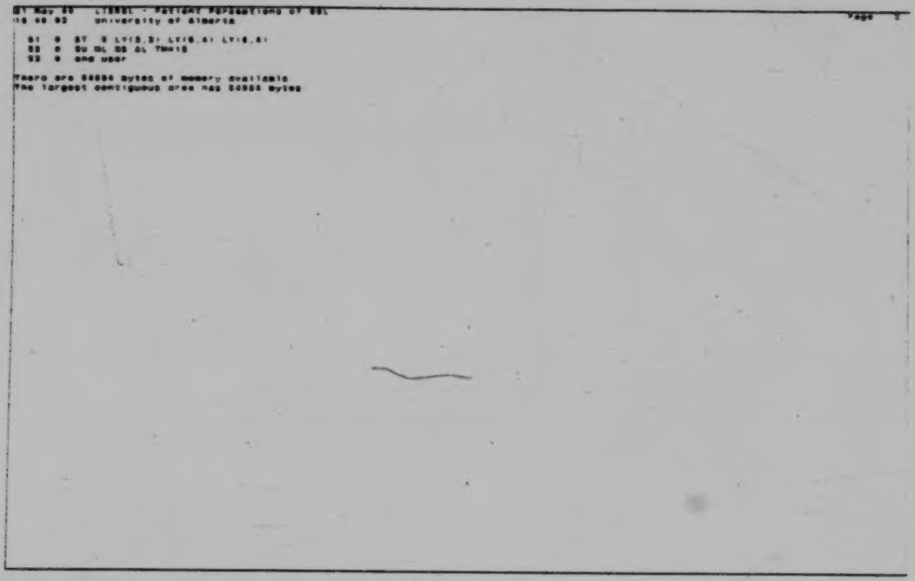
Variables	Interesting	Enjoyable	Easy	Worthwhile	Friendly	Full	Hopeful	Free	Rewarding	Brings Out Best in Me	Overall Life Satisfaction
Interesting	1.0										
Enjoyable	.81	1.0									
Easy	.65	.71	1.0								
Worthwhile	.78	.76	.59	1.0							
Friendly	.66	.61	.58	.63	1.0						
Full	.81	.76	.65	.76	.74	1.0					
Hopeful	.70	.73	.66	.74	.59	.69	1.0				
Free	.56	.61	.69	.51	.46	.58	.69	1.0			
Rewarding	.71	.75	.67	.71	.54	.69	.80	.73	1.0		
Brings Out Best In Me	.63	.69	.64	.71	.67	.69	.69	.62	.73	1.0	
Overall Life Satisfaction	.68	.71	.64	.69	.62	.69	.72	.67	.78	.80	1.0

Appendix 6. Correlation Matrix: Items in Index of Well-Being (Physicians' Reports)

Variables	Interesting	Enjoyable	Easy	Worthwhile	Friendly	Full	Hopeful	Free	Rewarding	Brings Out Best in Me	Overall Life Satisfaction
Interesting	1.0										
Enjoyable	.73	1.0									
Easy	.44	.61	1.0								
Worthwhile	.76	.67	.41	1.0							
Friendly	.56	.66	.50	.60	1.0						
Full	.78	.75	.53	.74	.69	1.0					
Hopeful	.64	.63	.47	.63	.55	.67	1.0				
Free	.55	.69	.64	.54	.48	.62	.65	1.0			
Rewarding	.53	.70	.59	.54	.53	.67	.70	.79	1.0		
Brings Out Best Ir. Me	.40	.56	.49	.37	.51	.58	.55	.62	.70	1.0	
Overall Life Satisfaction	.63	.75	.61	.64	.64	.71	.71	.76	.79	.65	1.0

Appendix 7: LISREL Model of Patients' Perceptions of their QOL





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[illegible]    University of Alberta

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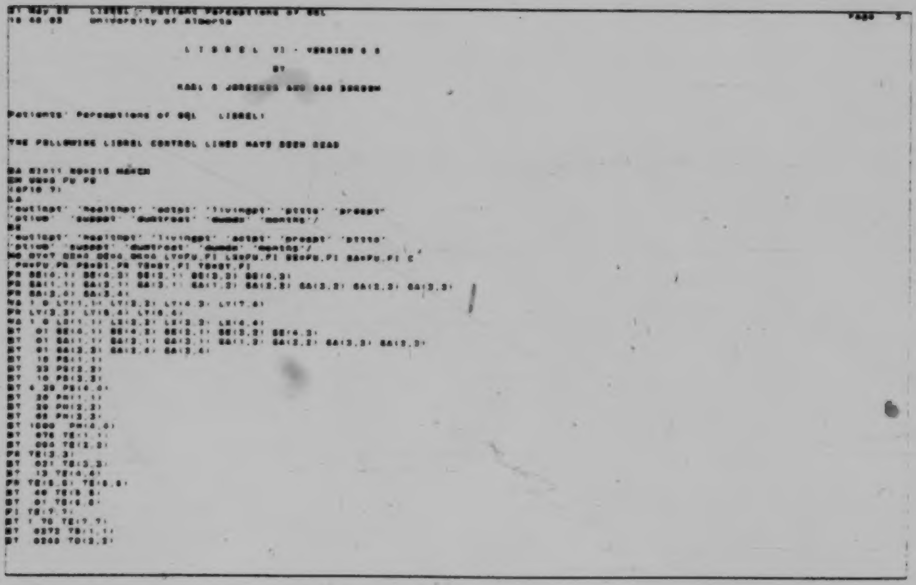

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[illegible]    University of Alberta

                    L I S R E L  VI - VERSION [illegible]

                                  BY

                   KARL G JORESKOG AND DAG SORBOM

Patients' Perceptions of QOL   LISREL1

THE FOLLOWING LISREL CONTROL LINES HAVE BEEN READ
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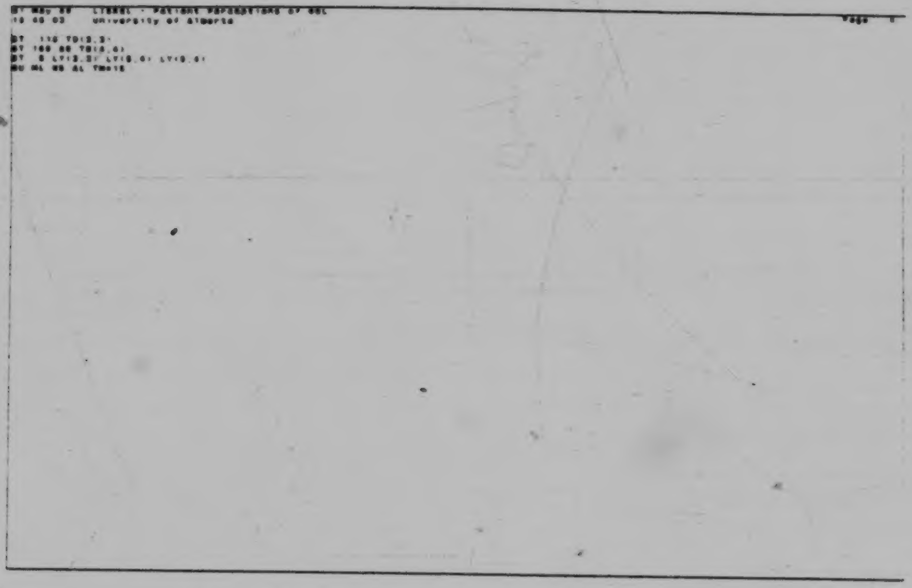

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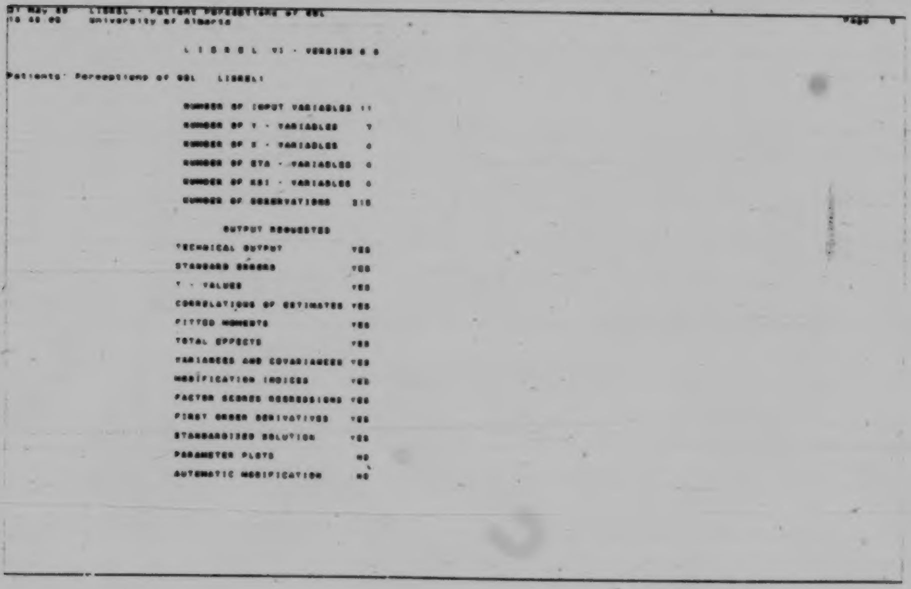
31 May 89   LISREL - Patient Perceptions of QOL                                   Page [illegible]
10 40 03    University of Alberta

ST .10 TD(3,3)
ST 100 BE TD(8,6)
ST  5 LY(3,3) LY(5,6) LY(8,6)
OU ML SE AL TM=15
```



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31 May 89   LISREL - Patient Perceptions of QOL                                   Page [illegible]
10 40 09    University of Alberta

                              L I S R E L  VI - VERSION 6.6

Patients' Perceptions of QOL   LISREL1

                              NUMBER OF INPUT VARIABLES 11
                              NUMBER OF Y - VARIABLES    7
                              NUMBER OF X - VARIABLES    4
                              NUMBER OF ETA - VARIABLES  6
                              NUMBER OF KSI - VARIABLES  4
                              NUMBER OF OBSERVATIONS   310

                                   OUTPUT REQUESTED
                             TECHNICAL OUTPUT          YES
                             STANDARD ERRORS           YES
                             T - VALUES                YES
                             CORRELATIONS OF ESTIMATES YES
                             FITTED MOMENTS            YES
                             TOTAL EFFECTS             YES
                             VARIANCES AND COVARIANCES YES
                             MODIFICATION INDICES      YES
                             FACTOR SCORES REGRESSIONS YES
                             FIRST ORDER DERIVATIVES   YES
                             STANDARDIZED SOLUTION     YES
                             PARAMETER PLOTS            NO
                             AUTOMATIC MODIFICATION     NO
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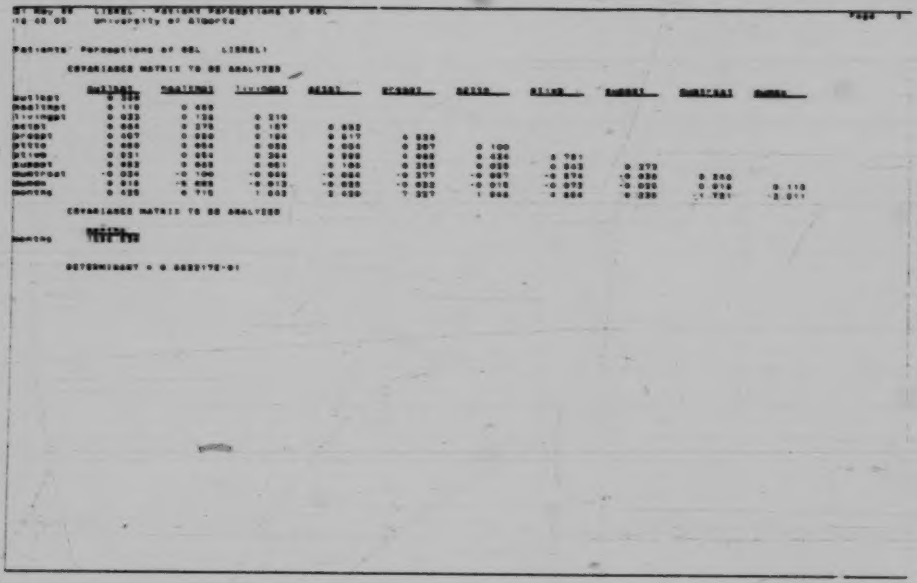
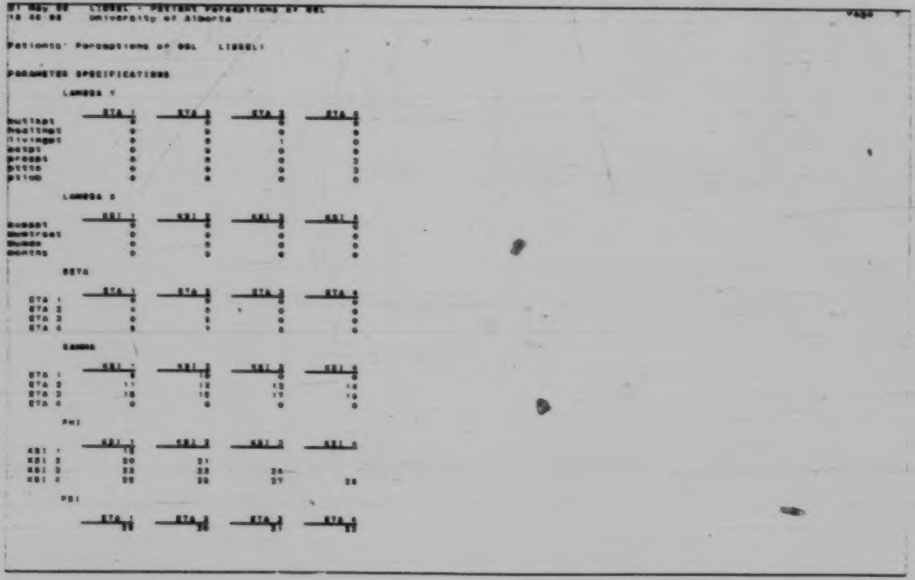


University of Alberta

Patients' Perceptions of QOL LISREL1

COVARIANCE MATRIX TO BE ANALYZED

COVARIANCE MATRIX TO BE ANALYZED



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Patients' Perceptions of QOL LISREL1

PARAMETER SPECIFICATIONS

LAMBDA Y

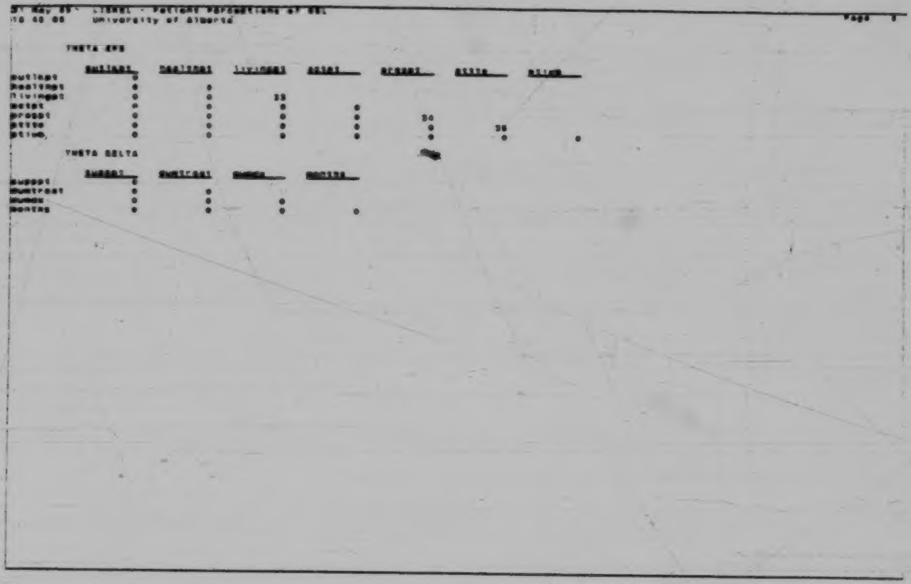
LAMBDA X

BETA

GAMMA

PHI

PSI



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LISREL - Patient Perceptions of QOL                                Page
University of Alberta

     THETA EPS

     THETA DELTA
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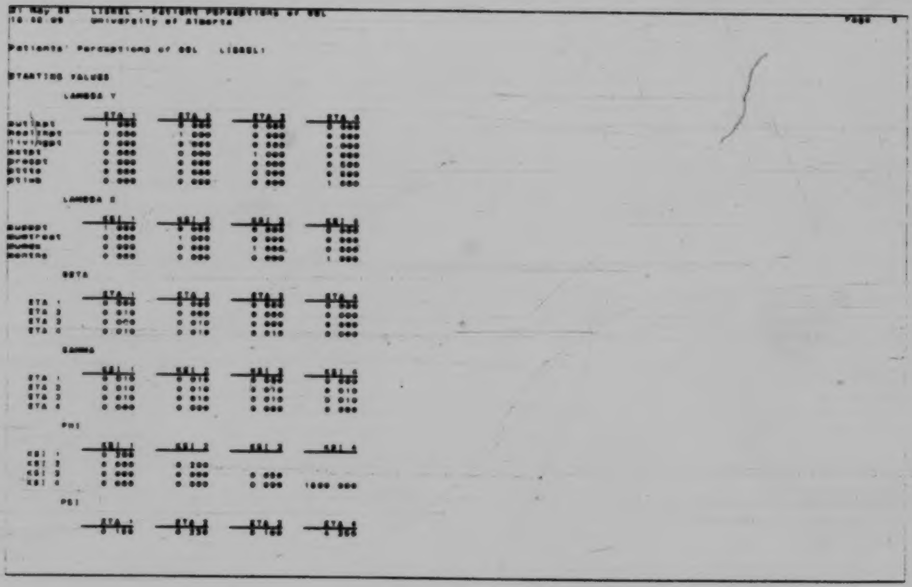

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LISREL - Patient Perceptions of QOL                                Page
University of Alberta

Patients' Perceptions of QOL (LISREL)

STARTING VALUES

        LAMBDA Y

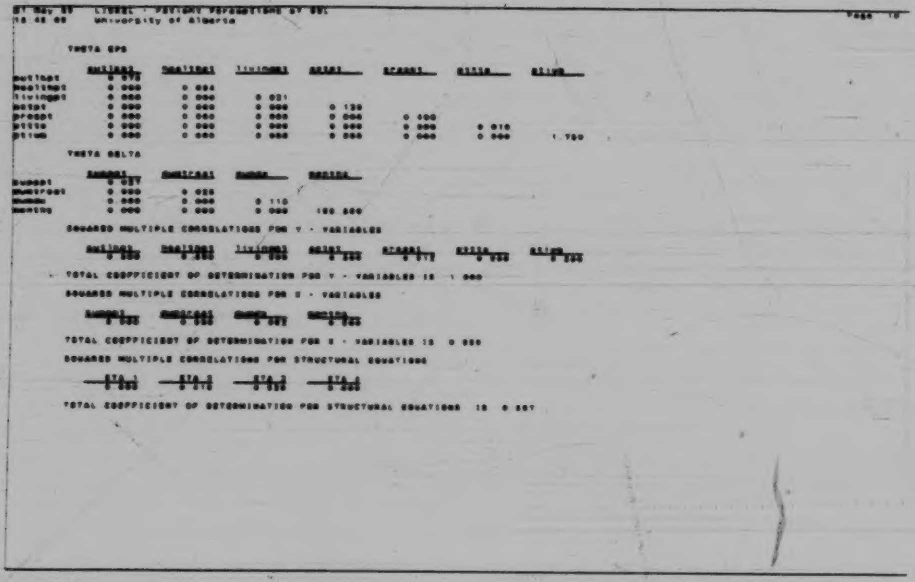
        LAMBDA X

        BETA

        GAMMA

        PHI

        PSI
```



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        University of Alberta

    THETA EPS

    THETA DELTA

    SQUARED MULTIPLE CORRELATIONS FOR Y - VARIABLES

    TOTAL COEFFICIENT OF DETERMINATION FOR Y - VARIABLES IS  1.000

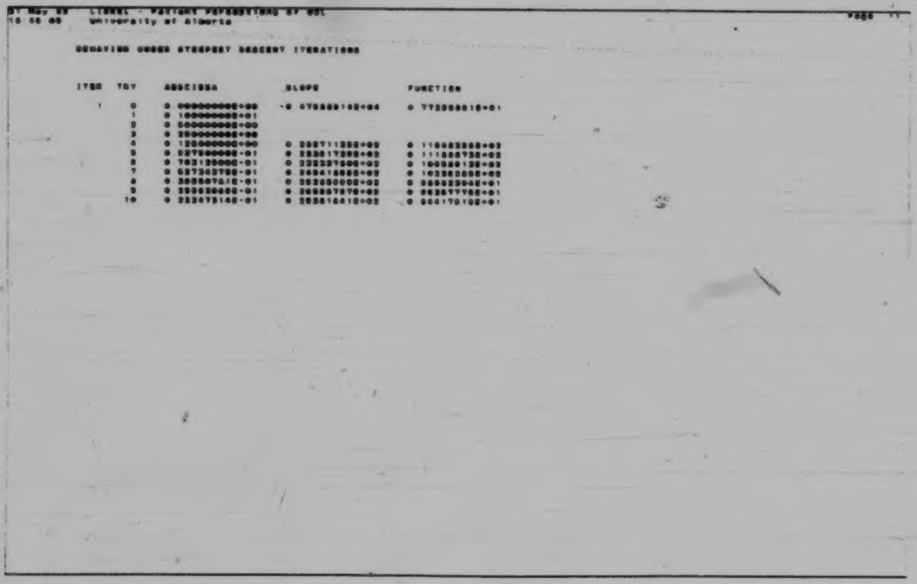
    SQUARED MULTIPLE CORRELATIONS FOR X - VARIABLES

    TOTAL COEFFICIENT OF DETERMINATION FOR X - VARIABLES IS

    SQUARED MULTIPLE CORRELATIONS FOR STRUCTURAL EQUATIONS

      ETA 1        ETA 2        ETA 3        ETA 4

    TOTAL COEFFICIENT OF DETERMINATION FOR STRUCTURAL EQUATIONS IS
```



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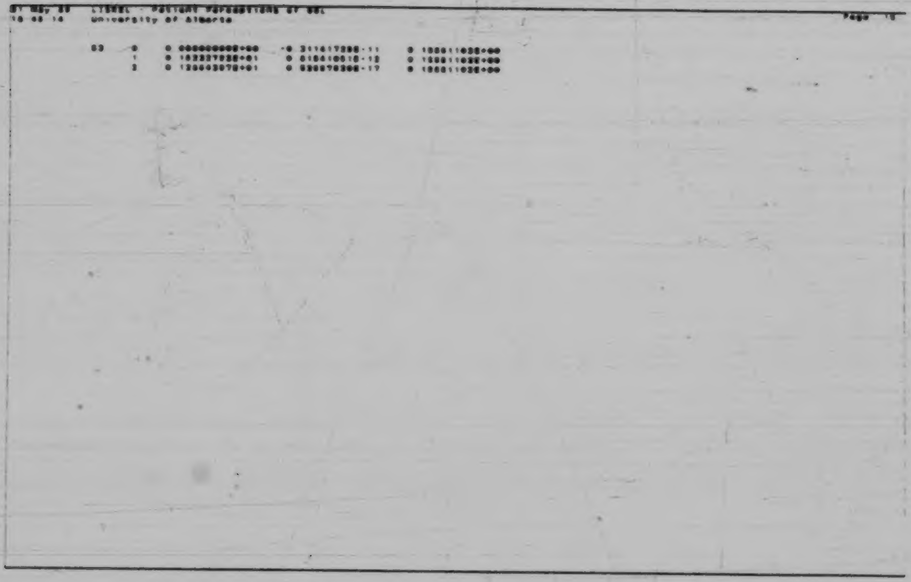
        University of Alberta

    BEHAVIOR UNDER STEEPEST DESCENT ITERATIONS

    ITER  TRY    ABSCISSA          SLOPE            FUNCTION

      1     0
            1
            2
            3
            4
            5
            6
            7
            8
            9
           10
```



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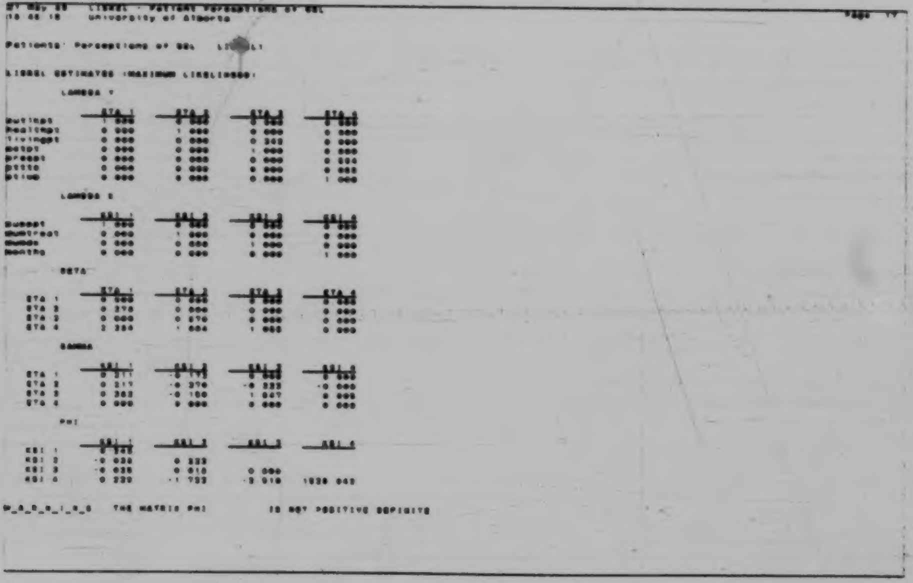
27 May 88   LISREL - Patient Perceptions of QOL                         Page 16
10 48 14    University of Alberta

        83   0   0.000000000D+00   -0.311617280D-11   0.100011020D+00
             1   0.162327920D+01    0.815410051D-12   0.100011020D+00
             2   0.120643070D+01    0.520076200D-17   0.100011020D+00
```



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27 May 88   LISREL - Patient Perceptions of QOL                         Page 17
10 48 18    University of Alberta

Patients' Perceptions of QOL   LIS[illegible]

LISREL ESTIMATES (MAXIMUM LIKELIHOOD)

        LAMBDA Y

                   ETA 1      ETA 2      ETA 3      ETA 4
 Outings           1.000      0.000      0.000      0.000
 Feelings          0.000      1.000      0.000      0.000
 Livings           0.000      0.000      0.342      0.000
 Motor             0.000      0.000      1.000      0.000
 Present           0.000      0.000      0.000      0.314
 Pitto             0.000      0.000      0.000      0.881
 Ptime             0.000      0.000      0.000      1.000

        LAMBDA X

                   KSI 1      KSI 2      KSI 3      KSI 4
 Budget            1.000      0.000      0.000      0.000
 Numtreat          0.000      1.000      0.000      0.000
 Number            0.000      0.000      1.000      0.000
 Months            0.000      0.000      0.000      1.000

        BETA

                   ETA 1      ETA 2      ETA 3      ETA 4
    ETA 1          0.000      0.000      0.000      0.000
    ETA 2          0.278      0.000      0.000      0.000
    ETA 3          0.000      0.570      0.000      0.000
    ETA 4          2.284      1.004      1.088      0.000

        GAMMA

                   KSI 1      KSI 2      KSI 3      KSI 4
    ETA 1          0.311     -0.173      0.000      0.000
    ETA 2          0.217     -0.370     -0.323     -0.000
    ETA 3          0.362     -0.150      1.047      0.000
    ETA 4          0.000      0.000      0.000      0.000

        PHI

                   KSI 1      KSI 2      KSI 3      KSI 4
    KSI 1          0.243
    KSI 2         -0.026      0.223
    KSI 3         -0.025      0.018      0.000
    KSI 4          0.220     -1.733     -3.016   1020.043

W_A_R_N_I_N_G   THE MATRIX PHI         IS NOT POSITIVE DEFINITE
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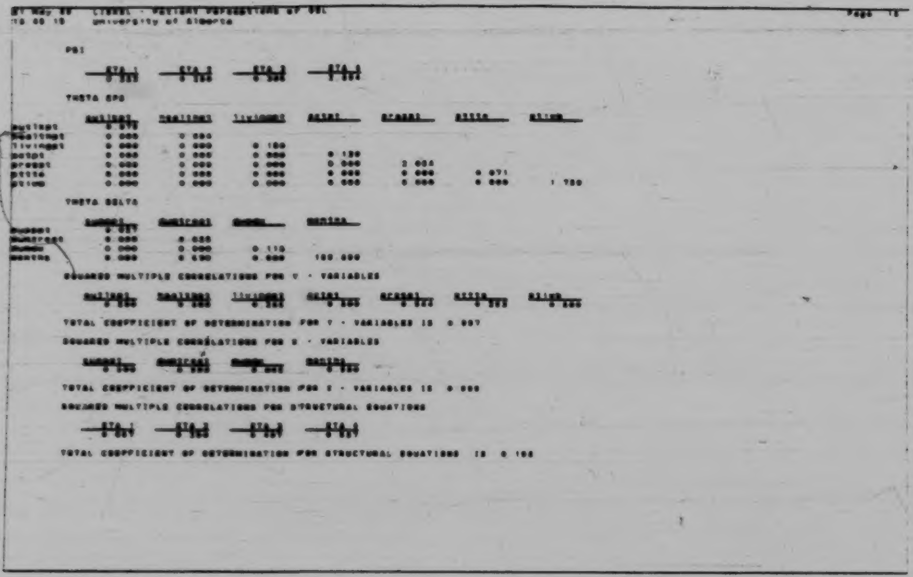

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[illegible]   LISREL - PATIENT PERCEPTIONS OF QOL                                    Page [illegible]
[illegible]   University of Alberta

        PSI

            ETA 1      ETA 2      ETA 3      ETA 4
        [illegible]

        THETA EPS

        [illegible]

        THETA DELTA

        [illegible]

        SQUARED MULTIPLE CORRELATIONS FOR Y - VARIABLES

        [illegible]

        TOTAL COEFFICIENT OF DETERMINATION FOR Y - VARIABLES IS  [illegible]

        SQUARED MULTIPLE CORRELATIONS FOR X - VARIABLES

        [illegible]

        TOTAL COEFFICIENT OF DETERMINATION FOR X - VARIABLES IS  [illegible]

        SQUARED MULTIPLE CORRELATIONS FOR STRUCTURAL EQUATIONS

            ETA 1      ETA 2      ETA 3      ETA 4
        [illegible]

        TOTAL COEFFICIENT OF DETERMINATION FOR STRUCTURAL EQUATIONS  IS  [illegible]
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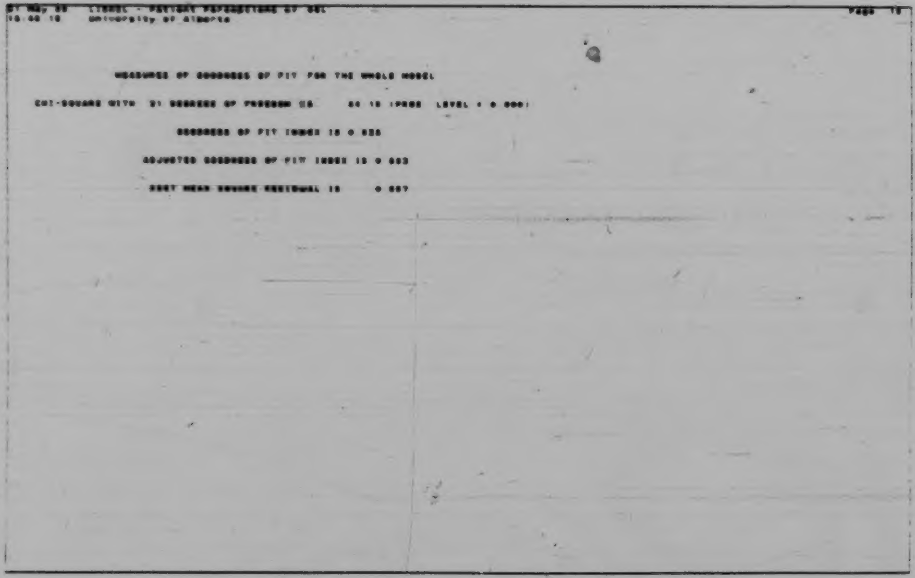

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[illegible]   LISREL - PATIENT PERCEPTIONS OF QOL                                    Page [illegible]
[illegible]   University of Alberta

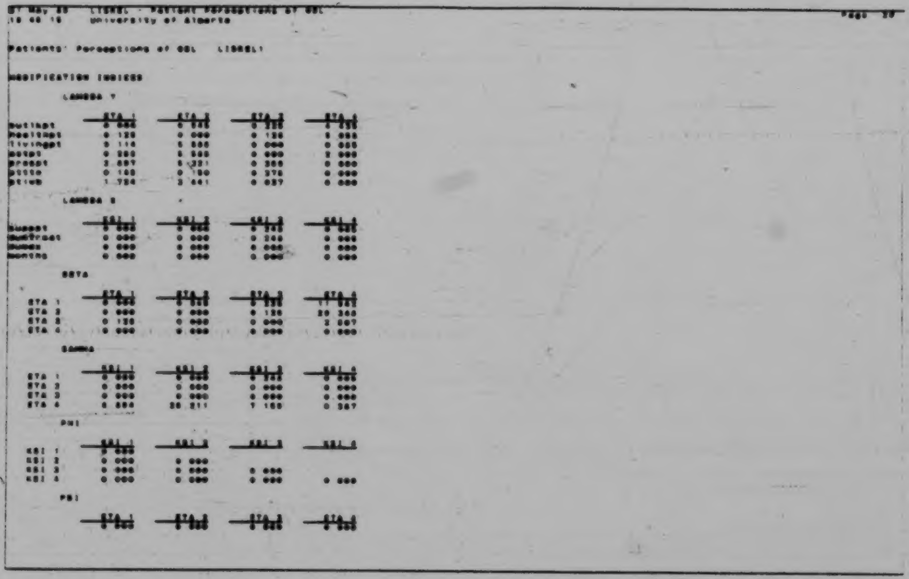
                  MEASURES OF GOODNESS OF FIT FOR THE WHOLE MODEL

    CHI-SQUARE WITH  21 DEGREES OF FREEDOM IS    [illegible] (PROB. LEVEL = [illegible])

                          GOODNESS OF FIT INDEX IS [illegible]

                     ADJUSTED GOODNESS OF FIT INDEX IS [illegible]

                     ROOT MEAN SQUARE RESIDUAL IS     [illegible]
```



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Patients' Perceptions of QOL LISREL1

MODIFICATION INDICES

LAMBDA Y

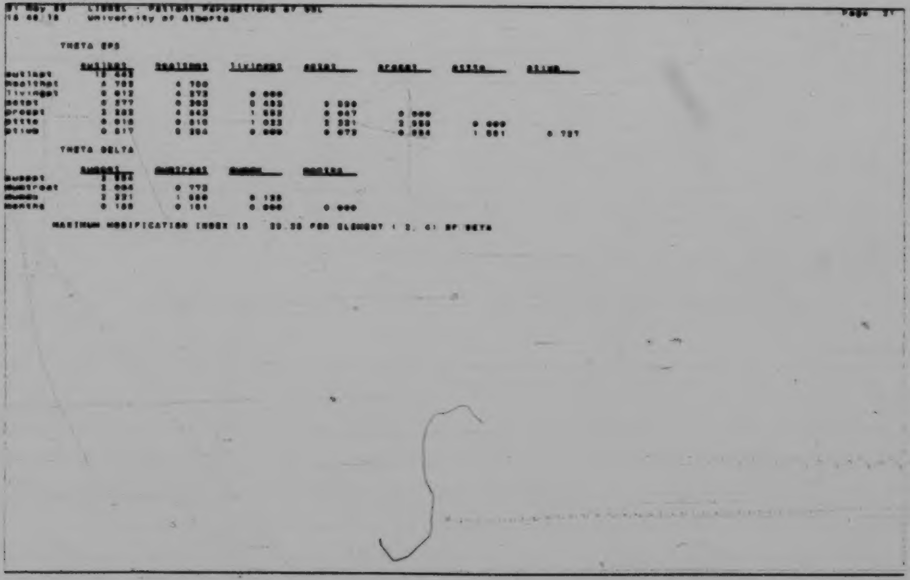
LAMBDA X

BETA

GAMMA

PHI

PSI



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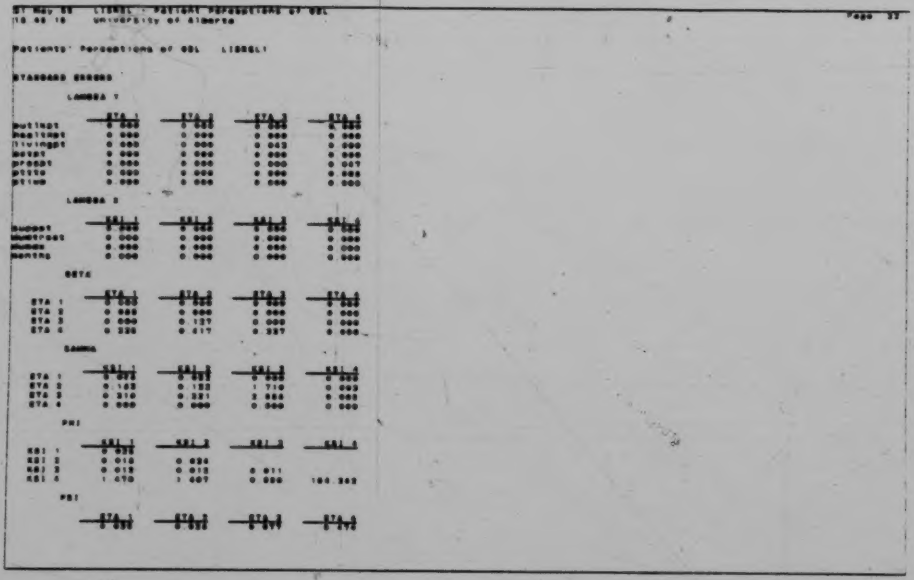
THETA EPS

THETA DELTA



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Patients' Perceptions of QOL LISREL

STANDARD ERRORS

LAMBDA Y

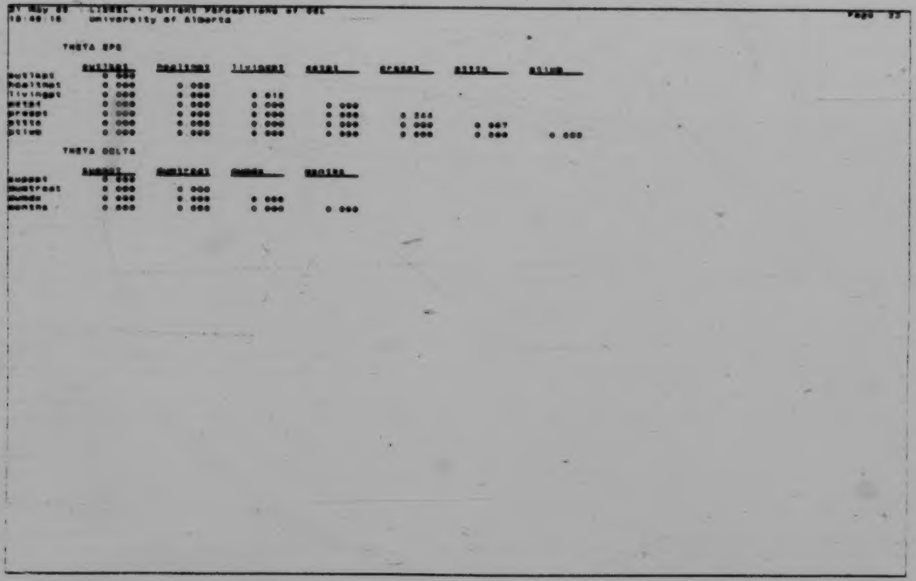
LAMBDA X

BETA

GAMMA

PHI

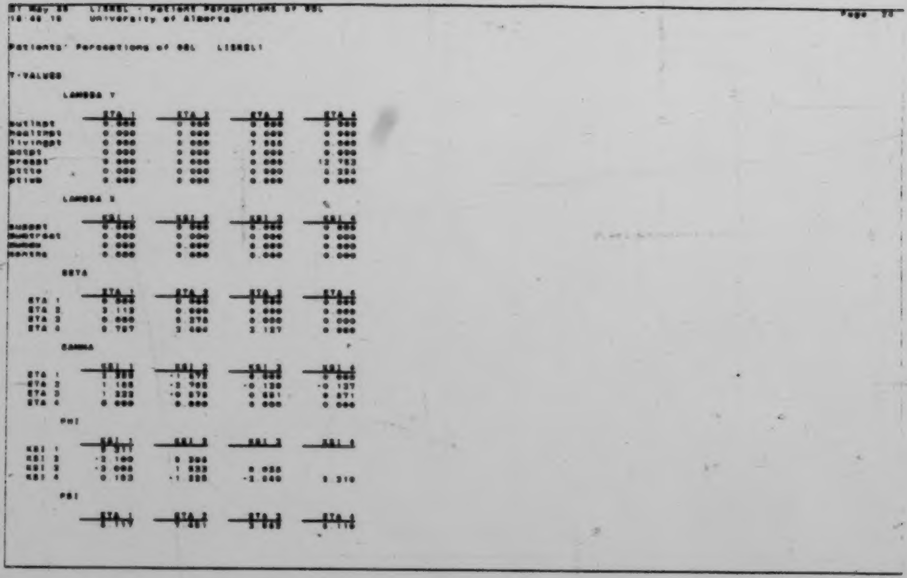
PSI



University of Alberta

THETA EPS

THETA DELTA



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LISREL - Patient Perceptions of QOL
University of Alberta

Patients' Perceptions of QOL   LISREL1

T-VALUES

        LAMBDA Y

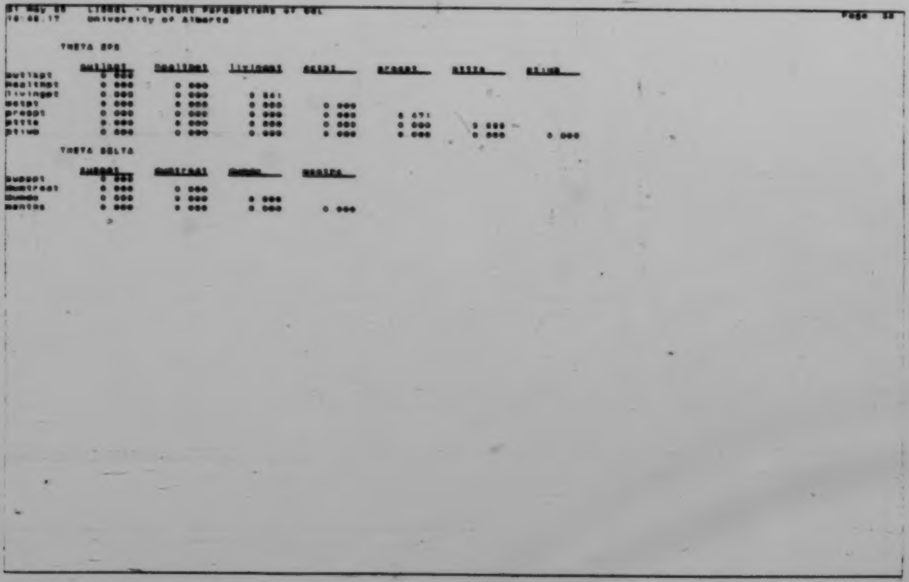
        LAMBDA X

        BETA

        GAMMA

        PHI

        PSI
```



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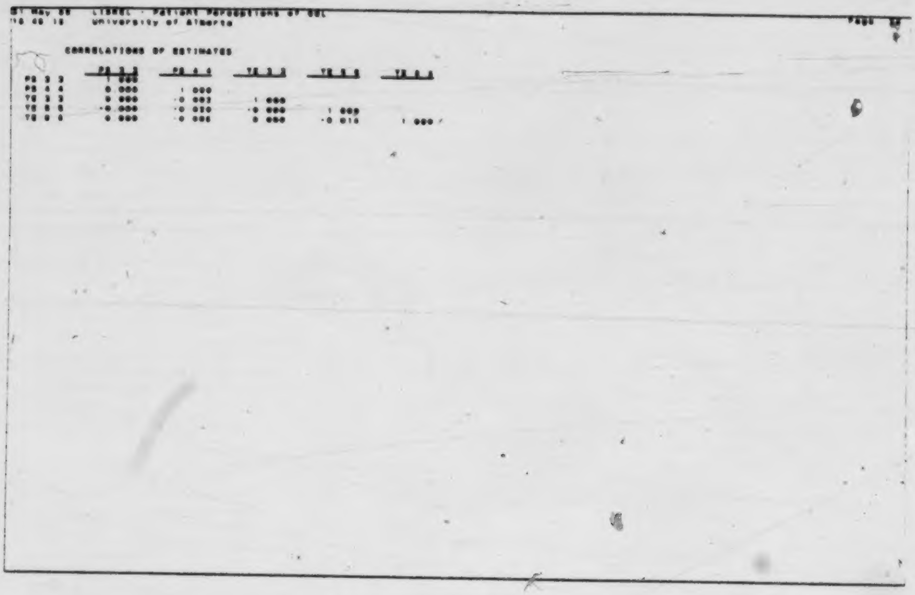
LISREL - Patient Perceptions of QOL
University of Alberta

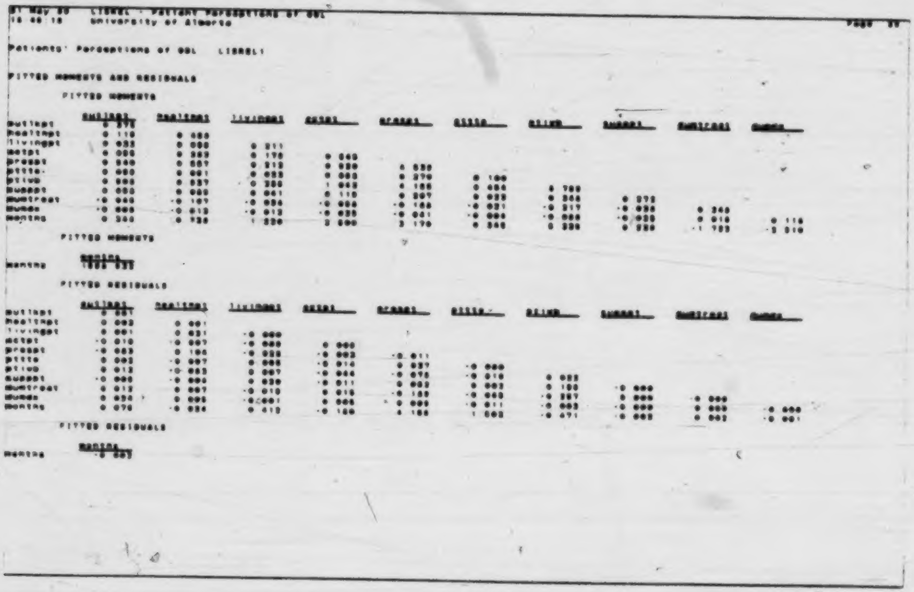
        THETA EPS

        THETA DELTA
```



LISREL - Patient Perceptions of QOL
University of Alberta

CORRELATIONS OF ESTIMATES



LISREL - Patient Perceptions of QOL
University of Alberta

Patients' Perceptions of QOL LISREL1

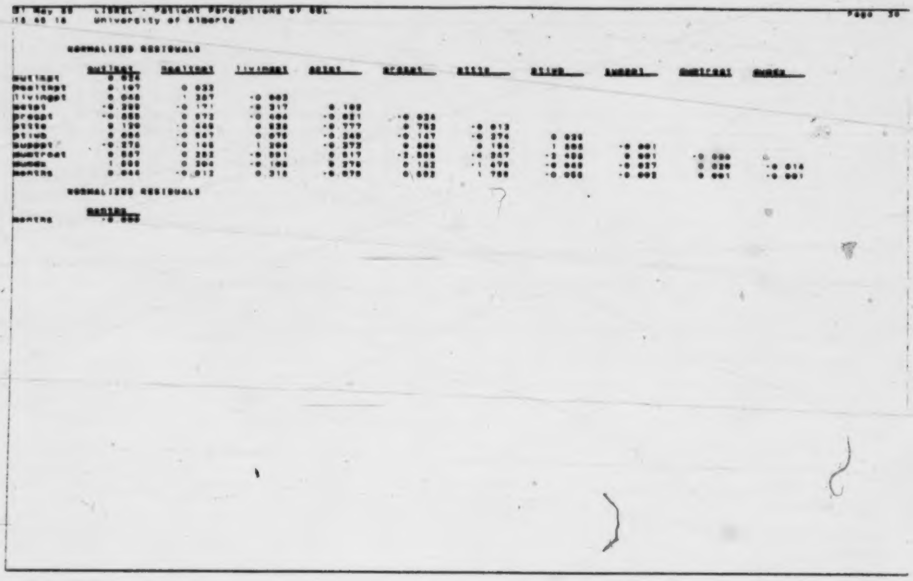
FITTED MOMENTS AND RESIDUALS

FITTED MOMENTS

FITTED MOMENTS

FITTED RESIDUALS

FITTED RESIDUALS

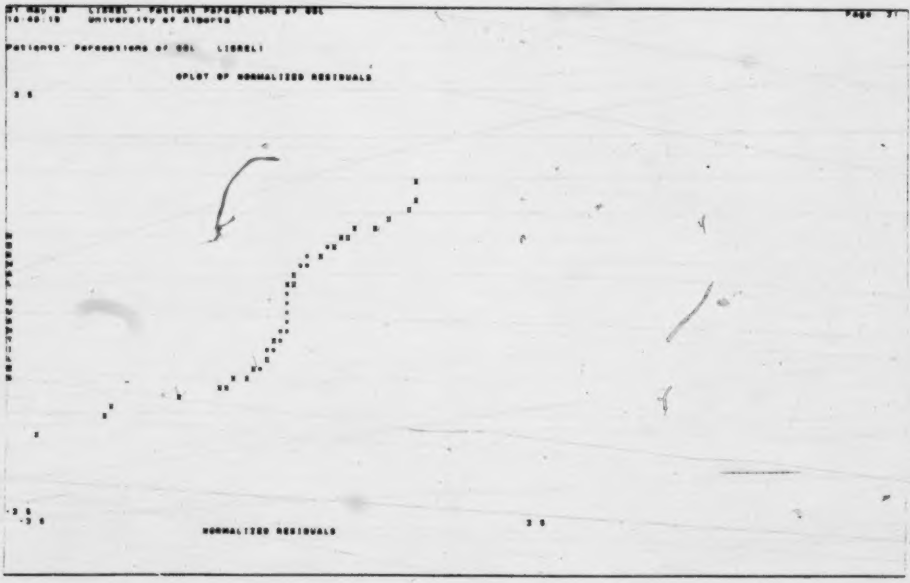


LISREL - Patient Perceptions of QOL

University of Alberta

NORMALIZED RESIDUALS

NORMALIZED RESIDUALS

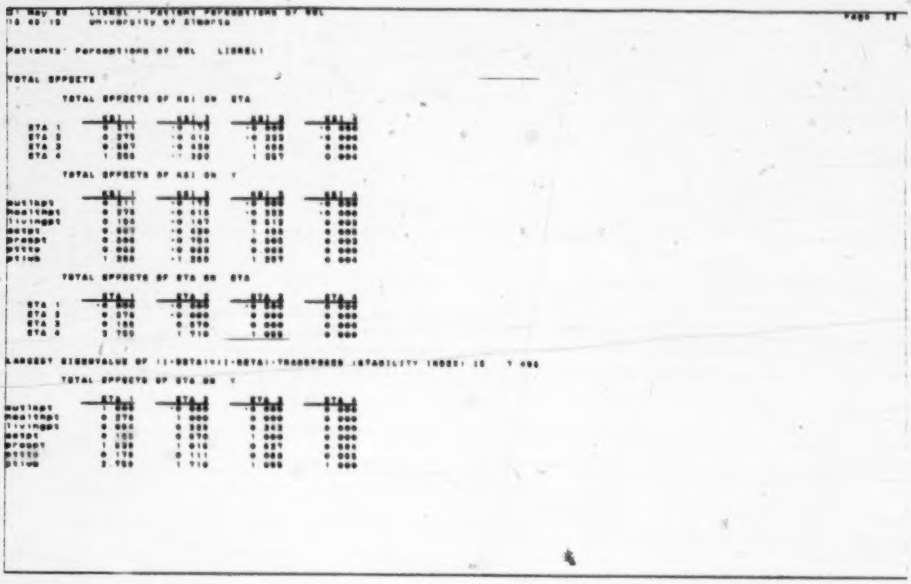


LISREL - Patient Perceptions of QOL

University of Alberta

Patients' Perceptions of QOL LISREL1

QPLOT OF NORMALIZED RESIDUALS



Patients' Perceptions of QOL LISREL

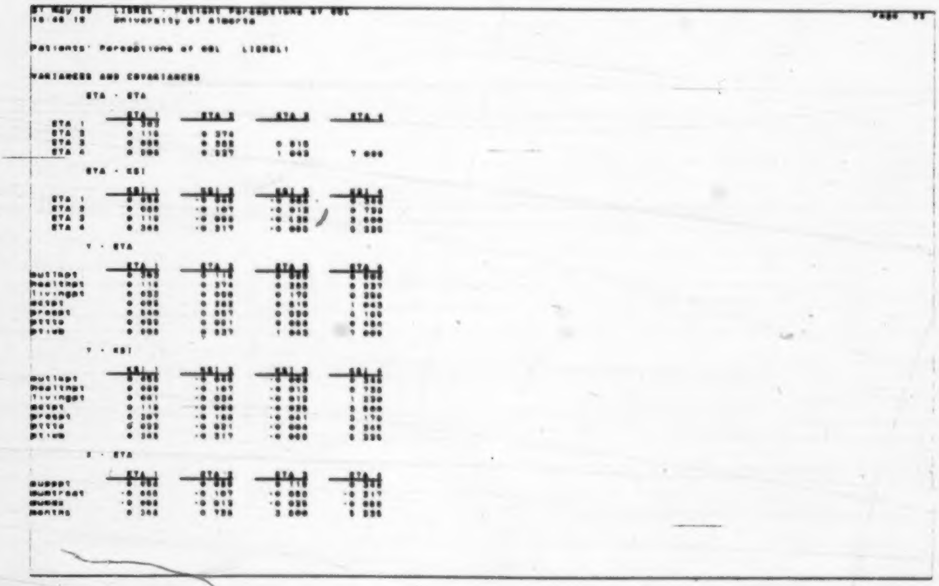
TOTAL EFFECTS

TOTAL EFFECTS OF KSI ON ETA

TOTAL EFFECTS OF KSI ON Y

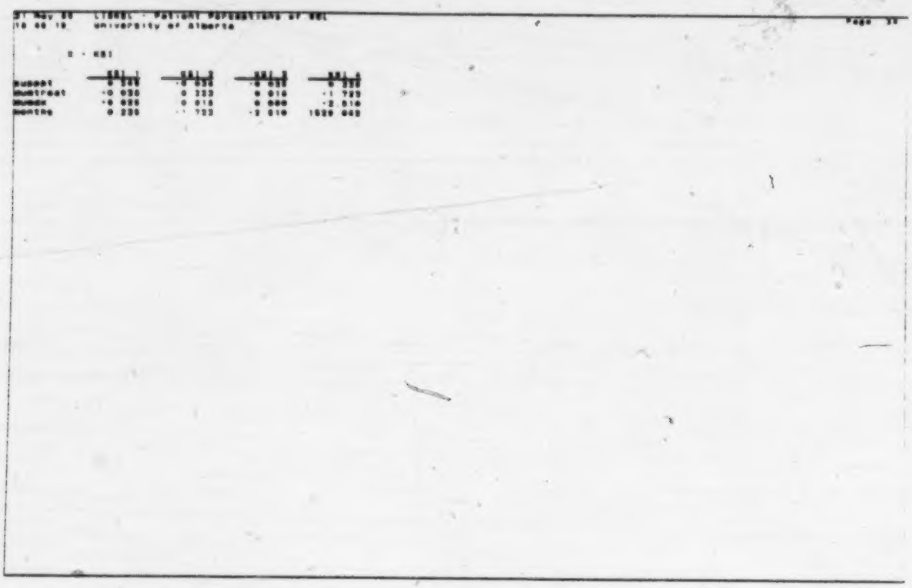
TOTAL EFFECTS OF ETA ON ETA

TOTAL EFFECTS OF ETA ON Y

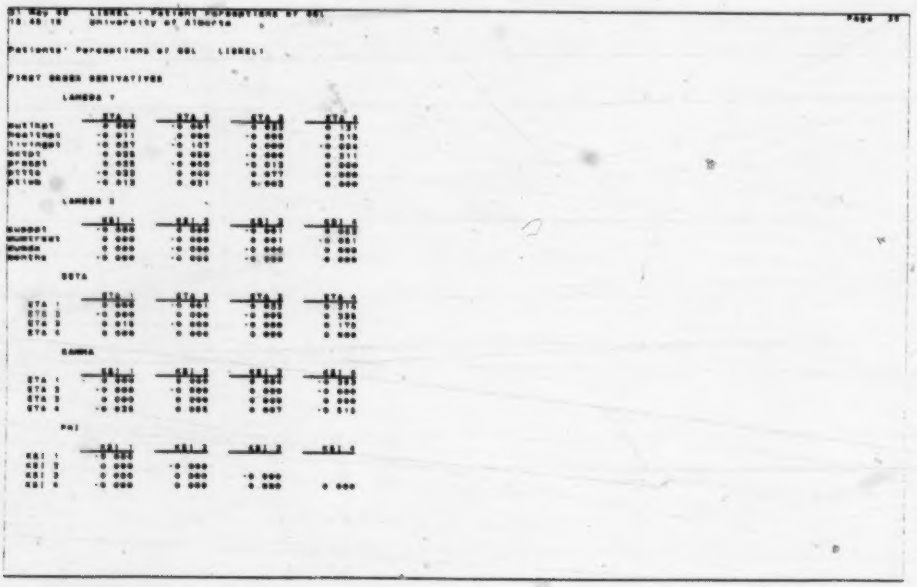


Patients' Perceptions of QOL LISREL

VARIANCES AND COVARIANCES



LISREL - Patient Perceptions of QOL
University of Alberta



LISREL - Patient Perceptions of QOL
University of Alberta

Patients' Perceptions of QOL (LISREL)

FIRST ORDER DERIVATIVES

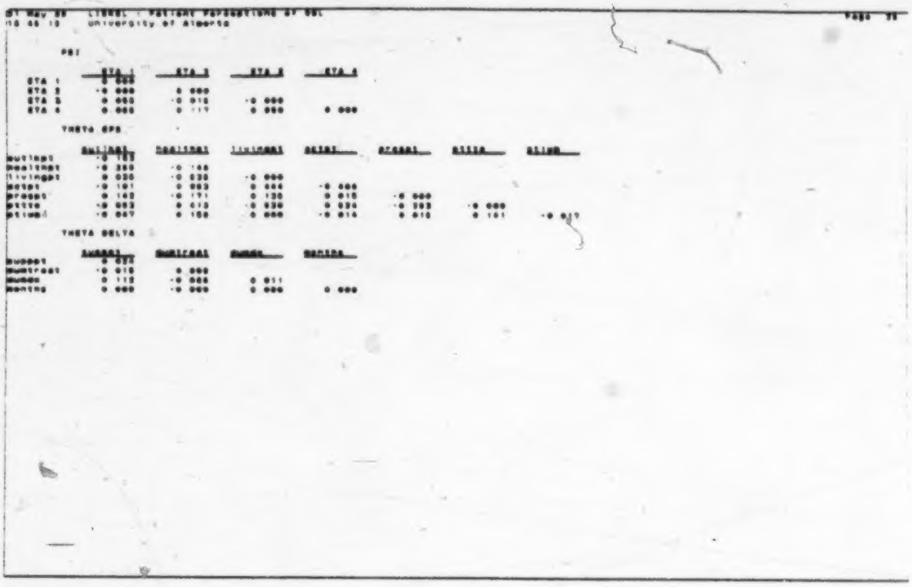
LAMBDA Y

LAMBDA X

BETA

GAMMA

PHI



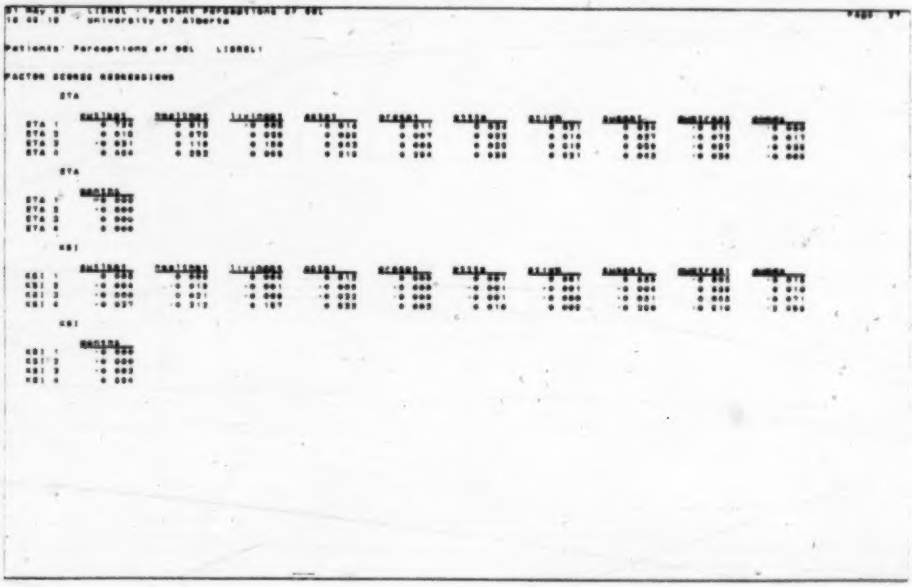
LISREL : Patient Perceptions of QOL

University of Alberta

PSI

THETA EPS

THETA DELTA



LISREL : Patient Perceptions of QOL

University of Alberta

Patients' Perceptions of QOL (LISREL)

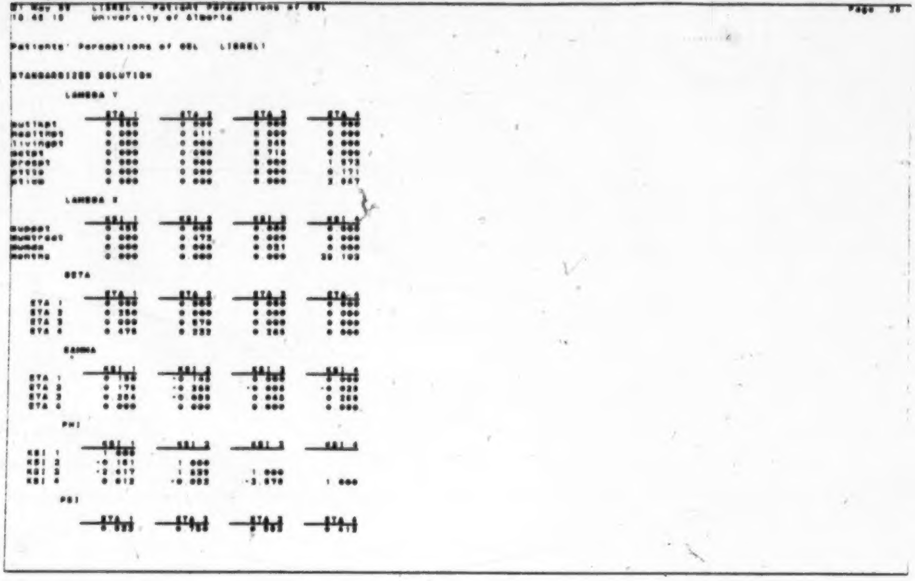
FACTOR SCORES REGRESSIONS

ETA

ETA

KSI

KSI



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University of Alberta

STANDARDIZED SOLUTION

        LAMBDA Y

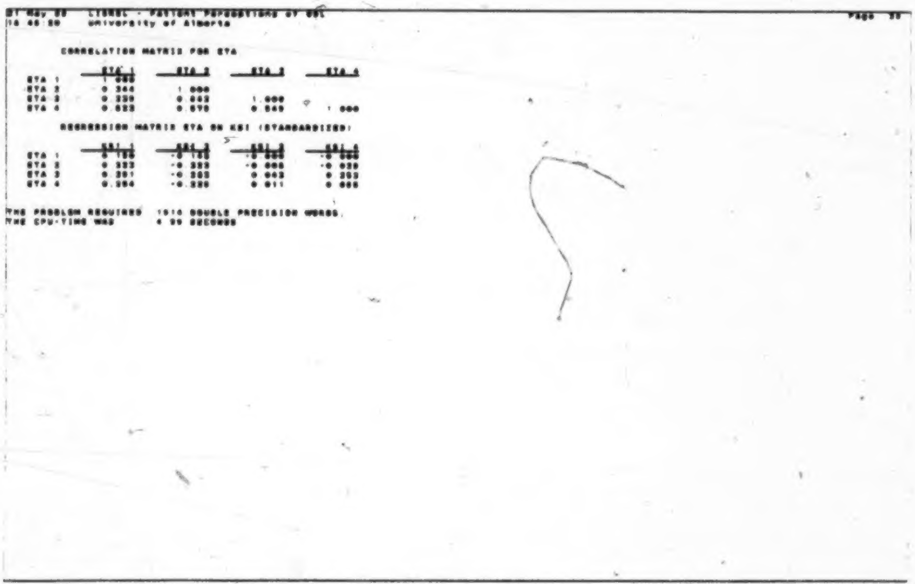
        LAMBDA X

        BETA

        GAMMA

        PHI

        PSI
```



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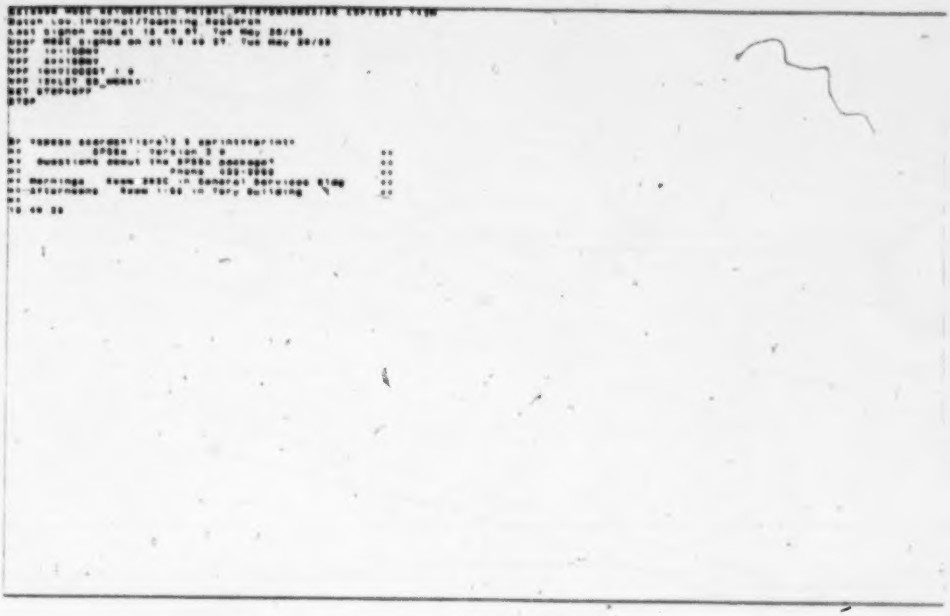
University of Alberta

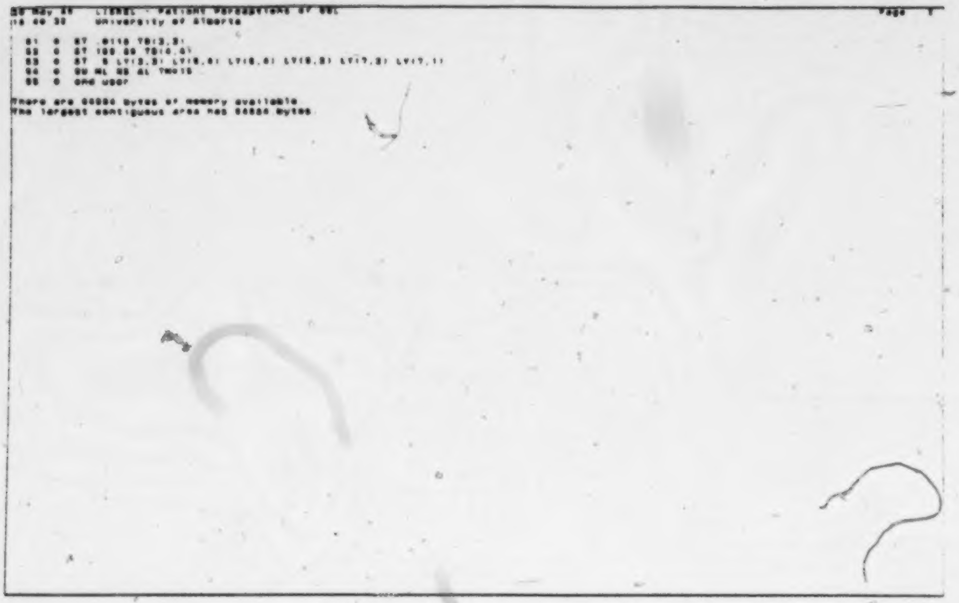
        CORRELATION MATRIX FOR ETA

        REGRESSION MATRIX ETA ON KSI (STANDARDIZED)

THE PROBLEM REQUIRED      DOUBLE PRECISION WORDS.
THE CPU-TIME WAS          SECONDS
```

Appendix 8: LISREL Model of Patients' Perceptions of their QOL (Revised)





```
LISREL - Patient Perceptions of QOL
University of Alberta

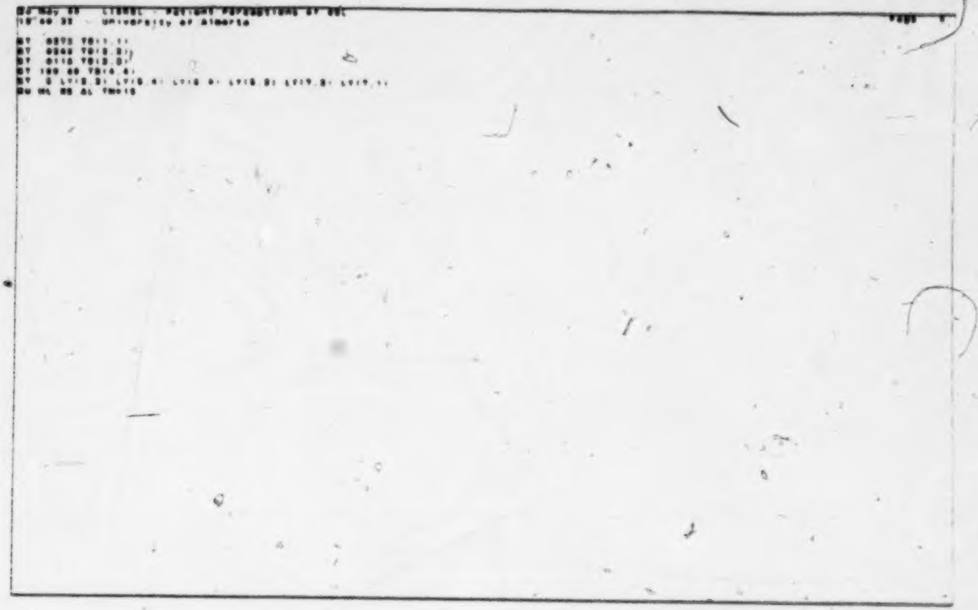
There are [illegible] bytes of memory available.
The largest contiguous area has [illegible] bytes.
```

```
LISREL - Patient Perceptions of QOL
University of Alberta

                    L I S R E L  VI - VERSION 6.6
                                BY
                    KARL G JORESKOG AND DAG SORBOM

Patients' Perceptions of QOL   LISREL1

THE FOLLOWING LISREL CONTROL LINES HAVE BEEN READ
```



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[illegible]  LISREL - PATIENT PERCEPTIONS OF QOL                    PAGE [illegible]
[illegible]  University of Alberta
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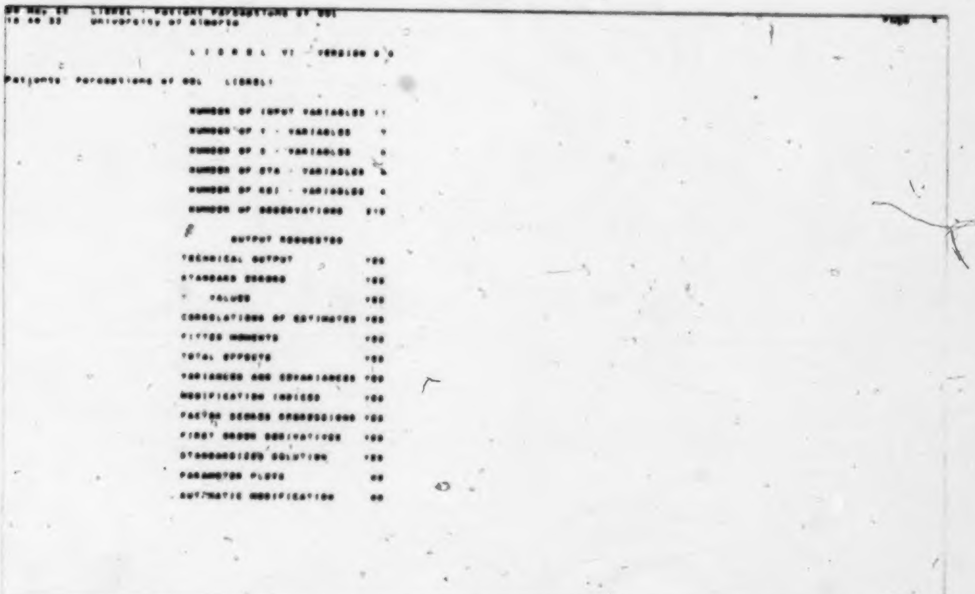

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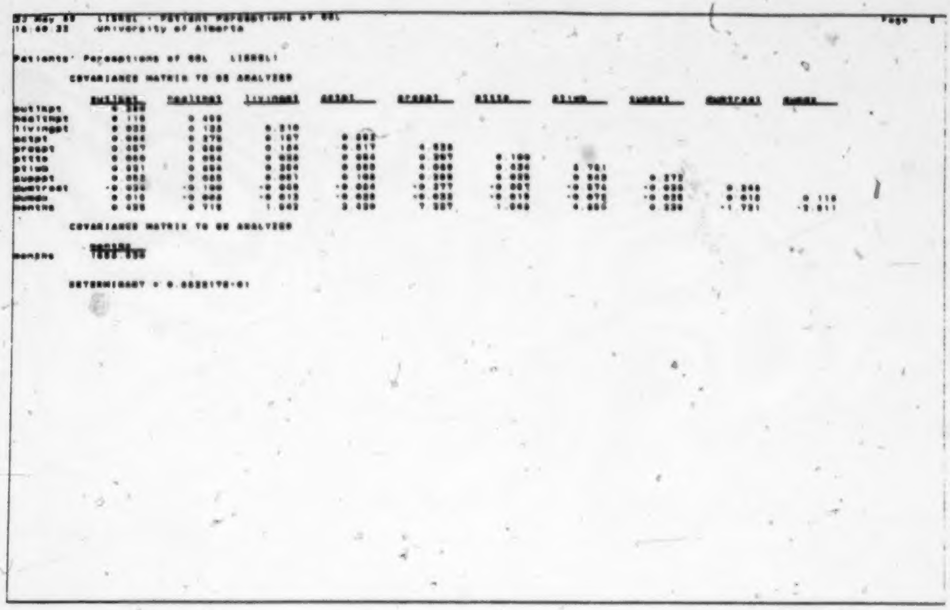
[illegible]  LISREL - PATIENT PERCEPTIONS OF QOL                    PAGE [illegible]
[illegible]  University of Alberta

                         L I S R E L  VI - VERSION [illegible]

Patients' Perceptions of QOL  (LISREL)

                         NUMBER OF INPUT VARIABLES [illegible]
                         NUMBER OF Y - VARIABLES   [illegible]
                         NUMBER OF X - VARIABLES   [illegible]
                         NUMBER OF ETA - VARIABLES [illegible]
                         NUMBER OF KSI - VARIABLES [illegible]
                         NUMBER OF OBSERVATIONS    [illegible]

                              OUTPUT REQUESTED
                        TECHNICAL OUTPUT              YES
                        STANDARD ERRORS               YES
                        T - VALUES                    YES
                        CORRELATIONS OF ESTIMATES     YES
                        FITTED MOMENTS                YES
                        TOTAL EFFECTS                 YES
                        VARIANCES AND COVARIANCES     YES
                        MODIFICATION INDICES          YES
                        FACTOR SCORES REGRESSIONS     YES
                        FIRST ORDER DERIVATIVES       YES
                        STANDARDIZED SOLUTION         YES
                        PARAMETER PLOTS                NO
                        AUTOMATIC MODIFICATION         NO
```



LISREL - Patient Perceptions of QOL

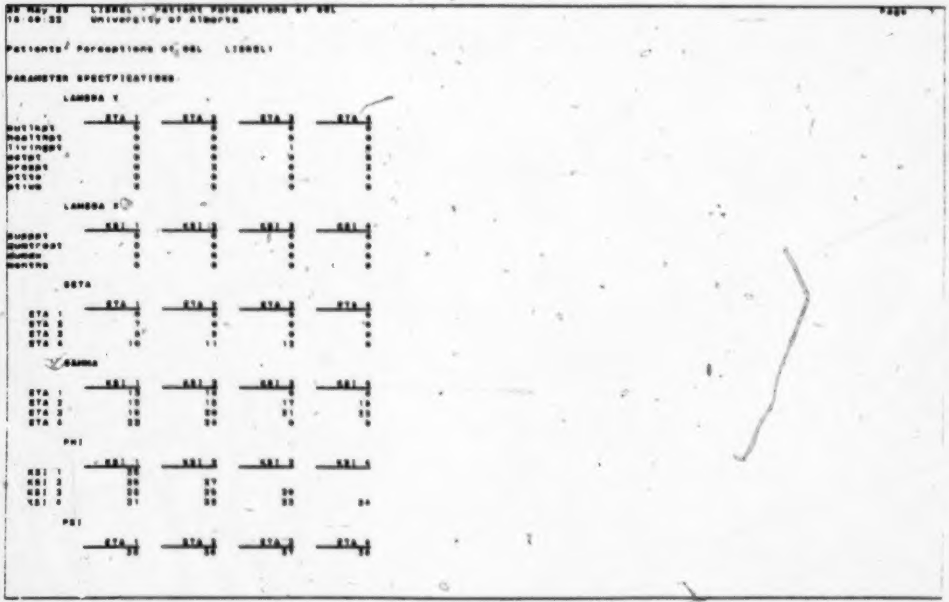
University of Alberta

Patients' Perceptions of QOL LISREL

COVARIANCE MATRIX TO BE ANALYZED

COVARIANCE MATRIX TO BE ANALYZED

DETERMINANT = [illegible]



LISREL - Patient Perceptions of QOL

University of Alberta

Patients' Perceptions of QOL LISREL

PARAMETER SPECIFICATIONS

LAMBDA Y

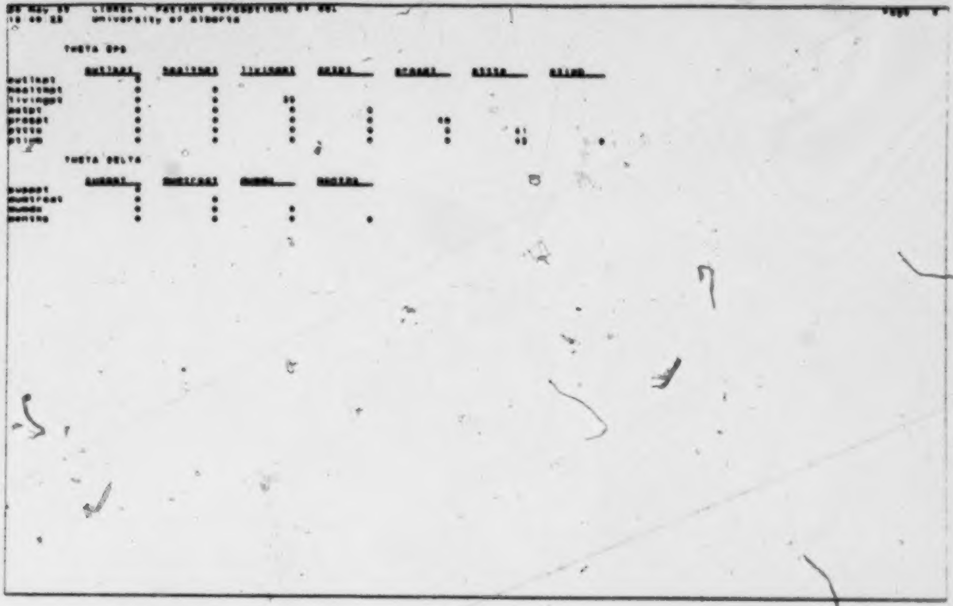
LAMBDA X

BETA

GAMMA

PHI

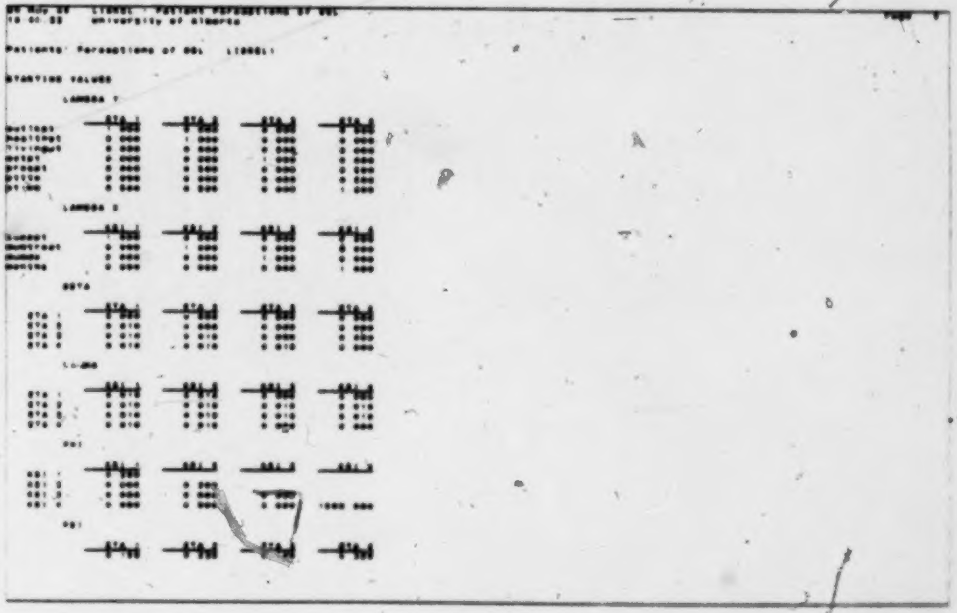
PSI



```
          University of Alberta

        THETA EPS

        THETA DELTA
```



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          University of Alberta

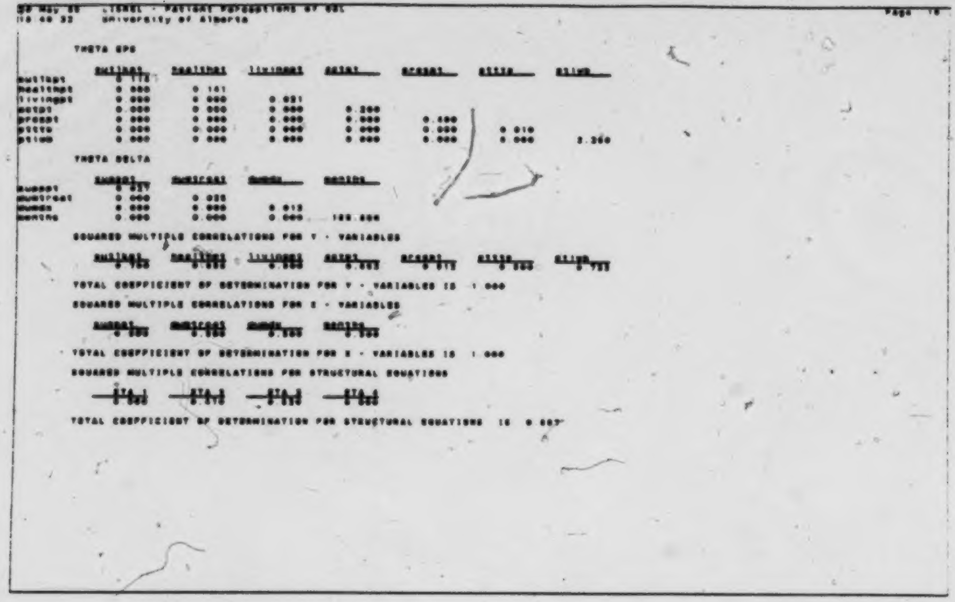
Patients' Perceptions of QOL   (LISREL)

STARTING VALUES

        LAMBDA Y

        LAMBDA X

        BETA
```



```
   May 85   LISREL - Patient Perceptions of QOL                    Page 10
18 40 32    University of Alberta

        THETA EPS

            [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]
[illegible]    0.1[illegible]
[illegible]    0.000      0.161
[illegible]    0.000      0.000      0.021
[illegible]    0.000      0.000      0.000      0.200
[illegible]    0.000      0.000      0.000      0.000      0.100
[illegible]    0.000      0.000      0.000      0.000      0.000      0.010
[illegible]    0.000      0.000      0.000      0.000      0.000      0.000      2.360

        THETA DELTA

            [illegible] [illegible] [illegible] [illegible]
[illegible]    0.027
[illegible]    0.000      0.020
[illegible]    0.000      0.000      0.013
[illegible]    0.000      0.000      0.000    1[illegible]

        SQUARED MULTIPLE CORRELATIONS FOR Y - VARIABLES

            [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

        TOTAL COEFFICIENT OF DETERMINATION FOR Y - VARIABLES IS  1.000

        SQUARED MULTIPLE CORRELATIONS FOR X - VARIABLES

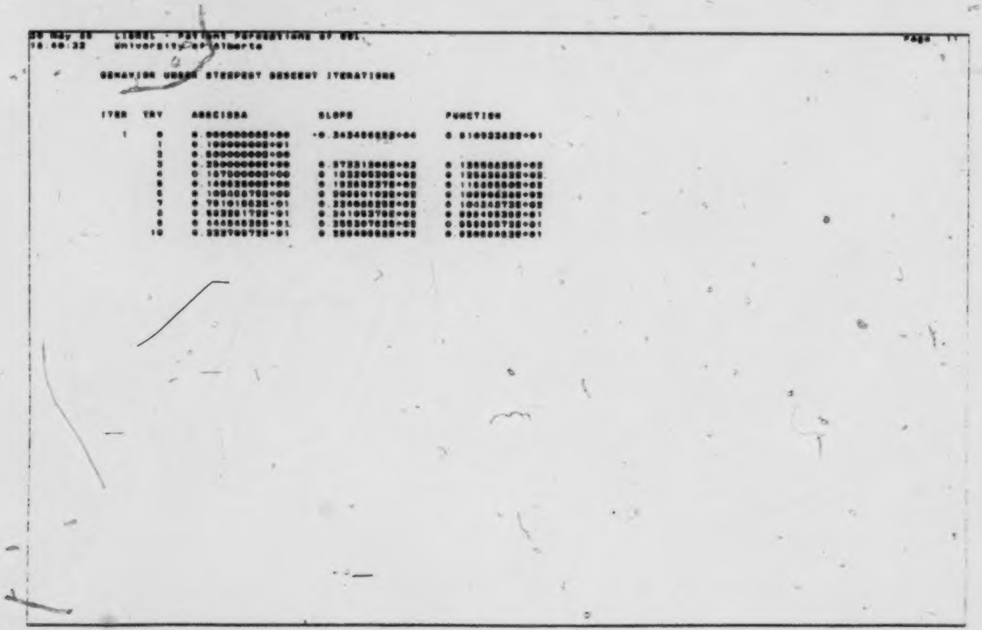
            [illegible] [illegible] [illegible] [illegible]

        TOTAL COEFFICIENT OF DETERMINATION FOR X - VARIABLES IS  1.000

        SQUARED MULTIPLE CORRELATIONS FOR STRUCTURAL EQUATIONS

            ETA 1      ETA 2      ETA 3      ETA 4
           [illegible] [illegible] [illegible] [illegible]

        TOTAL COEFFICIENT OF DETERMINATION FOR STRUCTURAL EQUATIONS  IS  0.587
```



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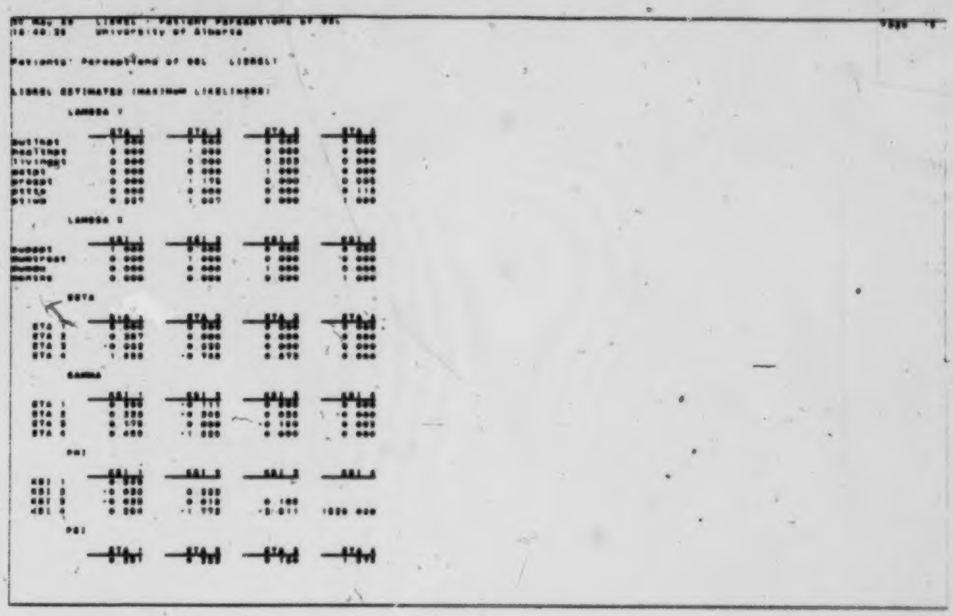
   May 85   LISREL - Patient Perceptions of QOL                    Page 11
18:40:32    University of Alberta

        BEHAVIOR UNDER STEEPEST DESCENT ITERATIONS

        ITER  TRY    ABSCISSA          SLOPE             FUNCTION

          1     0    0.00000000D+00    -0.34346682D+04    0.81093342D+01
                1    0.10000000D+01
                2    0.50000000D+00
                3    0.25000000D+00    [illegible]       [illegible]
                4    0.12500000D+00    [illegible]       [illegible]
                5    [illegible]       [illegible]       [illegible]
                6    [illegible]       [illegible]       [illegible]
                7    [illegible]       [illegible]       [illegible]
                8    [illegible]       [illegible]       [illegible]
                9    [illegible]       [illegible]       [illegible]
               10    [illegible]       [illegible]       [illegible]
```



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LISREL - PATIENT PERCEPTIONS OF QOL
University of Alberta

Patients' Perceptions of QOL (LISREL)

LISREL ESTIMATES (MAXIMUM LIKELIHOOD)

        LAMBDA Y

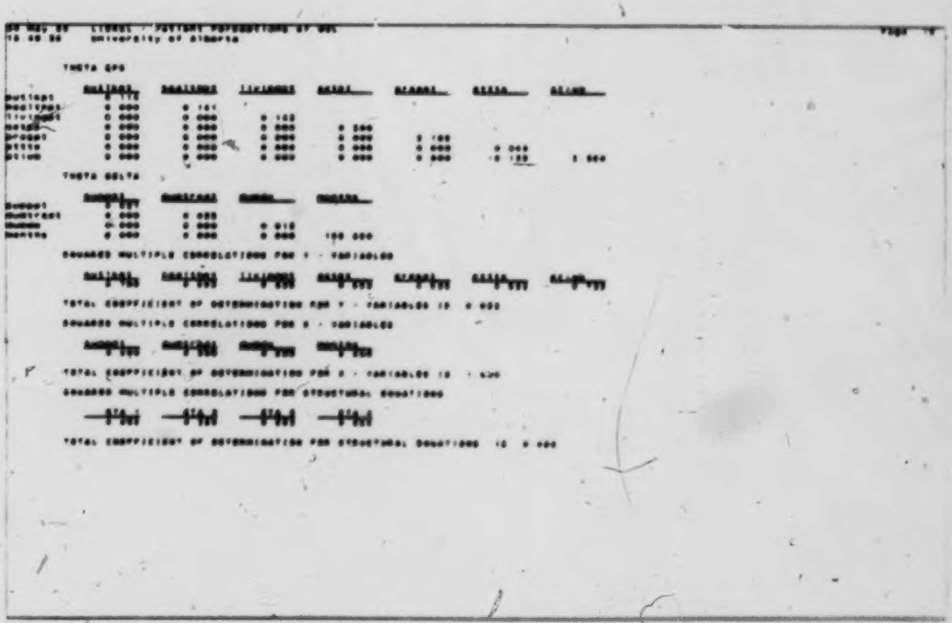
        LAMBDA X

        BETA

        GAMMA

        PHI

        PSI
```



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LISREL - PATIENT PERCEPTIONS OF QOL
University of Alberta

        THETA EPS

        THETA DELTA

        SQUARED MULTIPLE CORRELATIONS FOR Y - VARIABLES

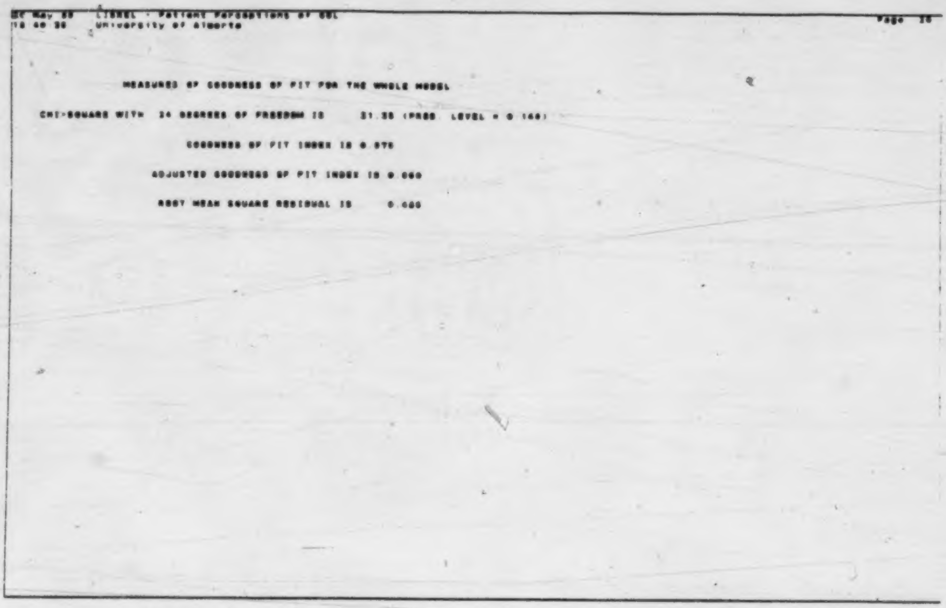
        TOTAL COEFFICIENT OF DETERMINATION FOR Y - VARIABLES IS

        SQUARED MULTIPLE CORRELATIONS FOR X - VARIABLES

        TOTAL COEFFICIENT OF DETERMINATION FOR X - VARIABLES IS

        SQUARED MULTIPLE CORRELATIONS FOR STRUCTURAL EQUATIONS

        TOTAL COEFFICIENT OF DETERMINATION FOR STRUCTURAL EQUATIONS IS
```



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   May        LISREL - Patient Perceptions of QOL                                      Page 26
15:40:38      University of Alberta

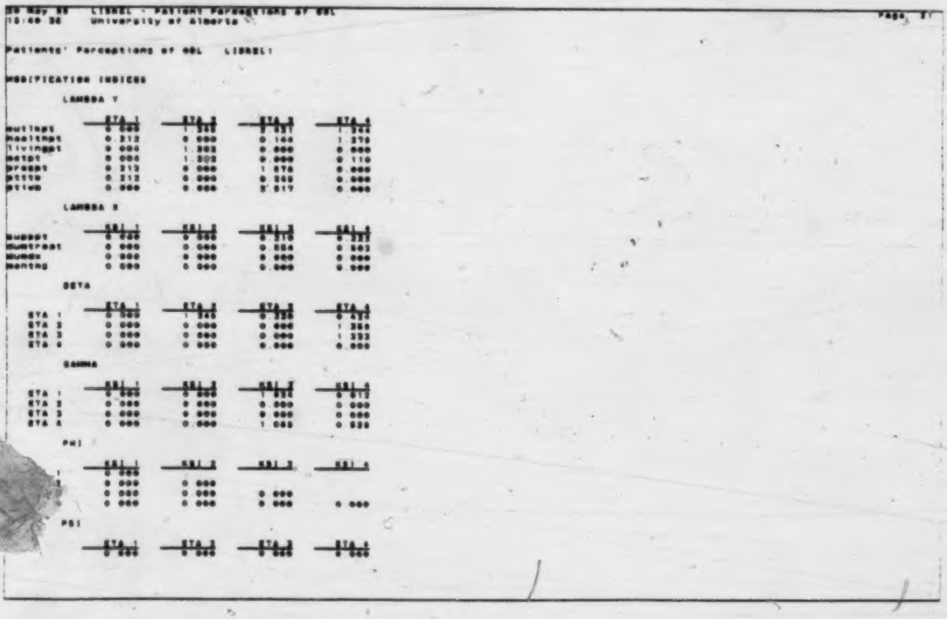
                    MEASURES OF GOODNESS OF FIT FOR THE WHOLE MODEL

     CHI-SQUARE WITH  24 DEGREES OF FREEDOM IS     31.38 (PROB. LEVEL = 0.146)

                              GOODNESS OF FIT INDEX IS 0.975

                         ADJUSTED GOODNESS OF FIT INDEX IS 0.960

                          ROOT MEAN SQUARE RESIDUAL IS     0.080
```



```
   May        LISREL - Patient Perceptions of QOL                                      Page 27
15:40:38      University of Alberta

Patients' Perceptions of QOL   LISREL1

MODIFICATION INDICES

          LAMBDA Y

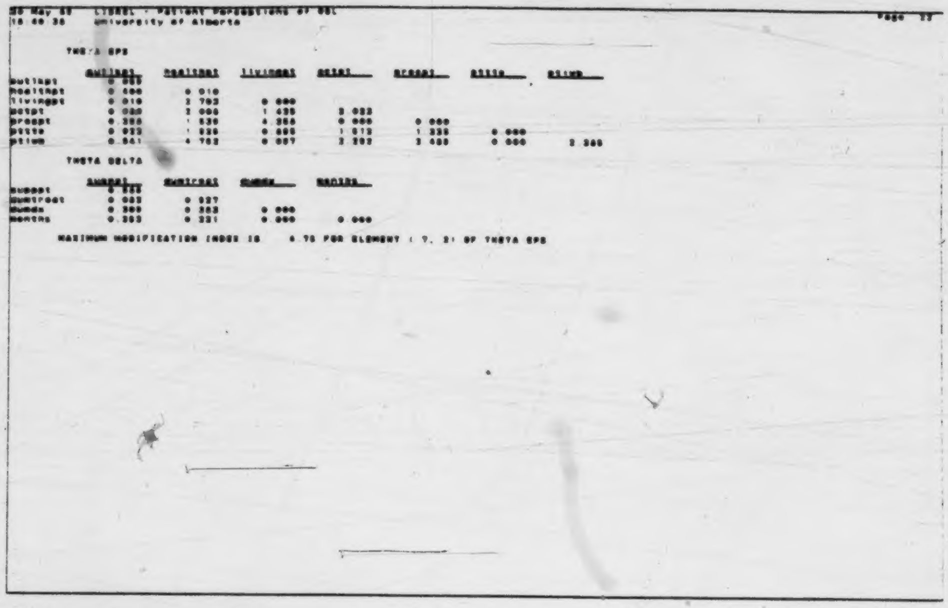
          LAMBDA X

          BETA

          GAMMA

          PHI

          PSI
```



```
                University of Alberta

        THETA EPS

        THETA DELTA

     MAXIMUM MODIFICATION INDEX IS    [illegible] FOR ELEMENT ( 7, 2) OF THETA EPS
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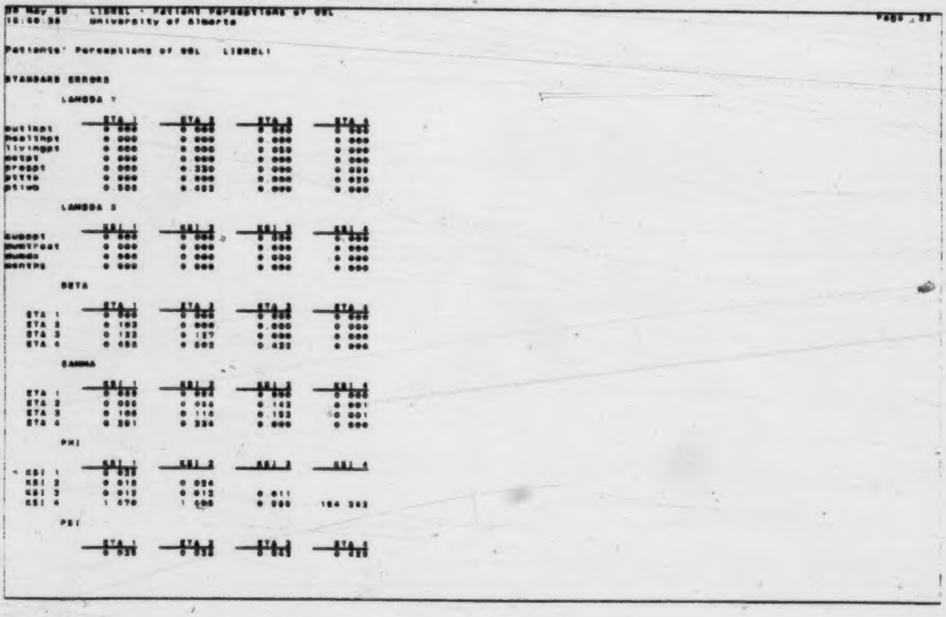

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                University of Alberta

Patients' Perceptions of QOL   LISREL1

STANDARD ERRORS

        LAMBDA Y

        LAMBDA X

        BETA

  ETA 1
  ETA 2
  ETA 3
  ETA 4

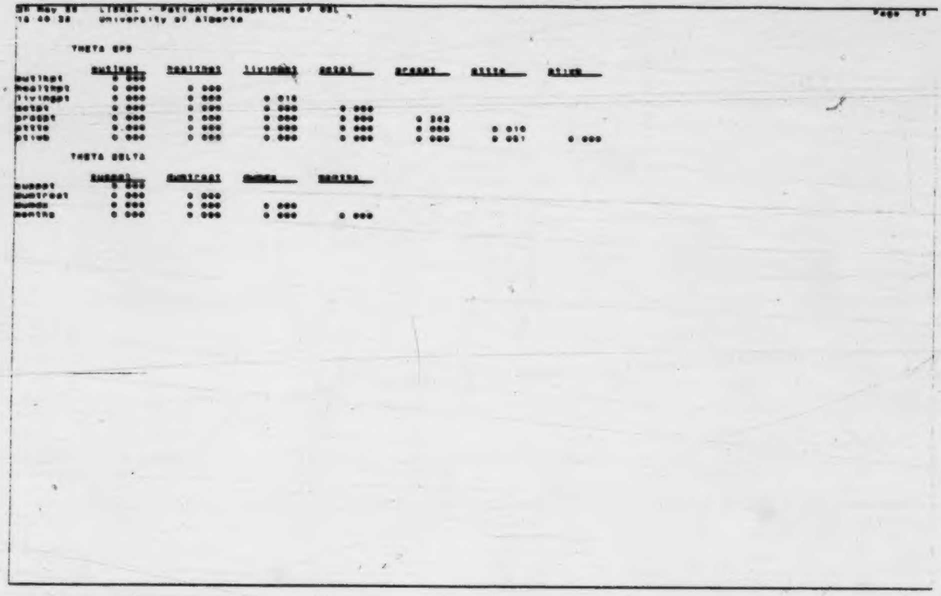
        GAMMA

  ETA 1
  ETA 2
  ETA 3
  ETA 4

        PHI

  KSI 1
  KSI 2
  KSI 3
  KSI 4

        PSI
```

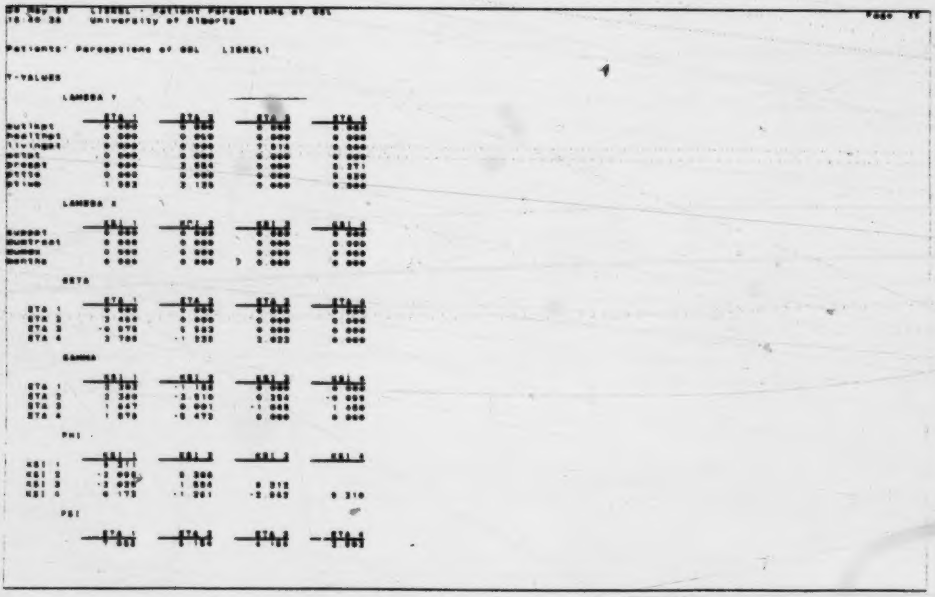


LISREL - Patient Perceptions of QOL

University of Alberta

THETA EPS

THETA DELTA



LISREL - Patient Perceptions of QOL

University of Alberta

Patients' Perceptions of QOL LISREL1

T-VALUES

LAMBDA Y

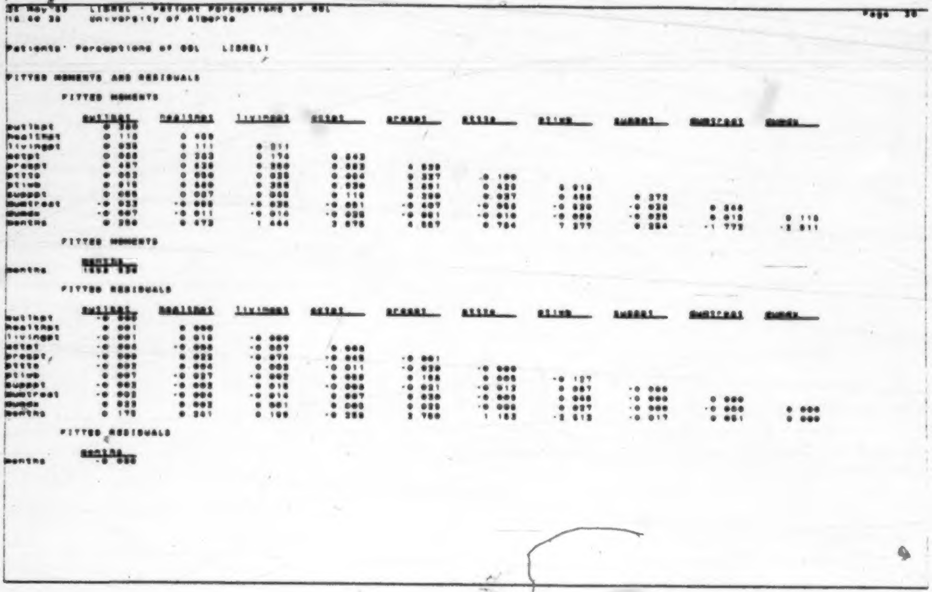
LAMBDA X

BETA

GAMMA

PHI

PSI



LISREL - Patient Perceptions of QOL
University of Alberta

Patients' Perceptions of QOL LISREL1

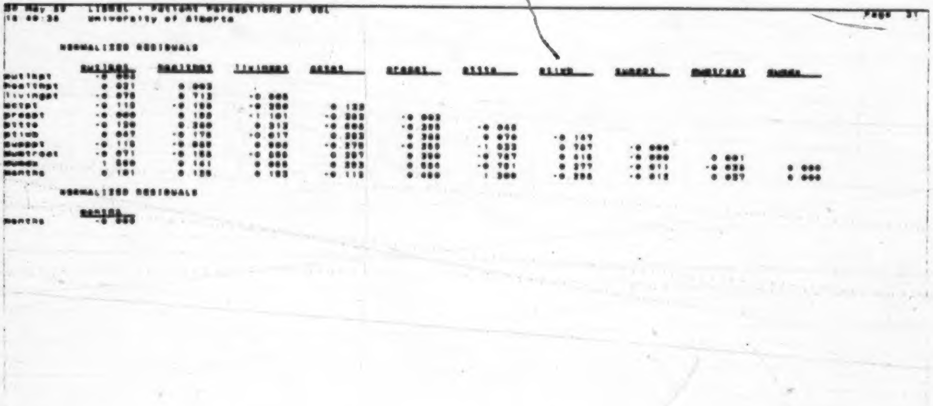
FITTED MOMENTS AND RESIDUALS

FITTED MOMENTS

FITTED MOMENTS

FITTED RESIDUALS

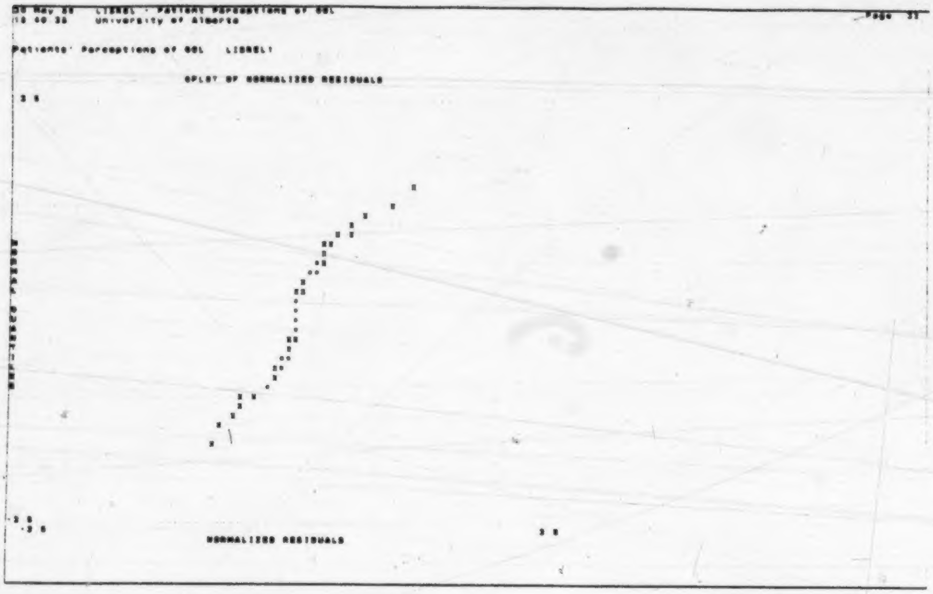
FITTED RESIDUALS



LISREL - Patient Perceptions of QOL
University of Alberta

NORMALIZED RESIDUALS

NORMALIZED RESIDUALS



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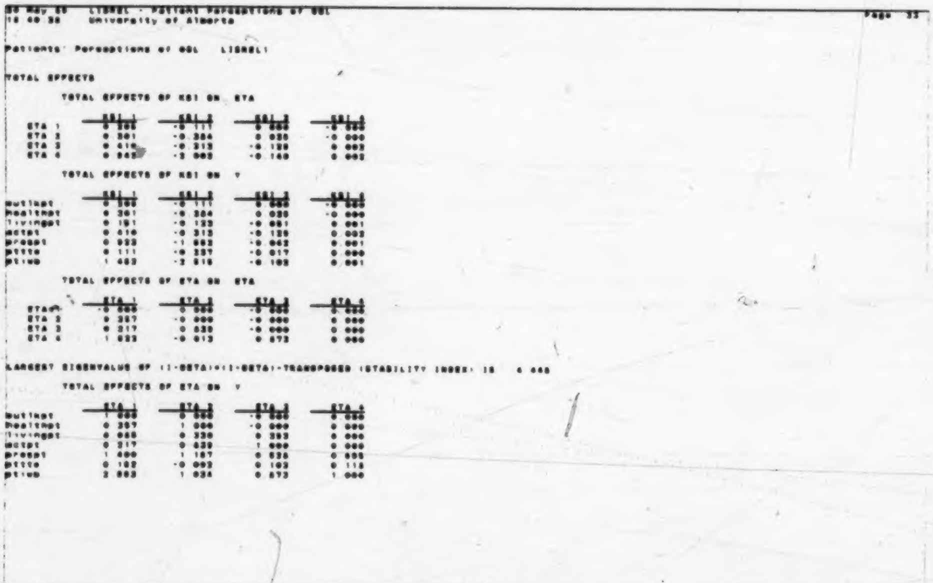
30 May 89   LISREL - Patient Perceptions of QOL                                  Page 31
18 40 38    University of Alberta

Patients' Perceptions of QOL   LISREL1

                         QPLOT OF NORMALIZED RESIDUALS
```



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30 May 89   LISREL - Patient Perceptions of QOL                                  Page 32
18 40 38    University of Alberta

Patients' Perceptions of QOL   LISREL1

TOTAL EFFECTS

        TOTAL EFFECTS OF KSI ON  ETA

               KSI 1      KSI 2      KSI 3      KSI 4
  ETA 1    [illegible] [illegible] [illegible] [illegible]
  ETA 2       0.301     -0.304      0.020     -0.000
  ETA 3       0.416     -0.313     -0.128      0.002
  ETA 4       0.842     -2.002     -0.140      0.002

        TOTAL EFFECTS OF KSI ON  Y

               KSI 1      KSI 2      KSI 3      KSI 4
outlnqt    [illegible] [illegible] [illegible] [illegible]
healtnqt      0.301     -0.304      0.020     -0.000
livingqt      0.151     -0.122     -0.001      0.001
mctqt         0.416     -0.312     -0.128      0.002
prespt        0.922     -1.082     -0.062      0.001
pt1te         0.111     -0.327     -0.017      0.000
pt1wb         1.482     -2.816     -0.102      0.001

        TOTAL EFFECTS OF ETA ON  ETA

               ETA 1      ETA 2      ETA 3      ETA 4
  ETA 1      -0.000      0.000     -0.000      0.000
  ETA 2       0.387     -0.000     -0.000      0.000
  ETA 3       0.217      0.820     -0.000      0.000
  ETA 4       1.823     -0.013      0.873      0.000

LARGEST EIGENVALUE OF (I-BETA)*(I-BETA)-TRANSPOSED (STABILITY INDEX) IS   6.468

        TOTAL EFFECTS OF ETA ON  Y

               ETA 1      ETA 2      ETA 3      ETA 4
outlnqt       1.000      0.000     -0.000      0.000
healtnqt      0.387      1.000     -0.000      0.000
livingqt      0.068      0.330      0.393      0.000
mctqt         0.217      0.820      1.000      0.000
prespt        1.400      1.187      0.826      0.000
pt1te         0.182     -0.092      0.102      0.118
pt1wb         2.083      1.024      0.873      1.000
```

```
30 May 95    LISREL - Patient Perceptions of QOL                                   Page 3[illegible]
15:40:38     University of Alberta

Patients' Perceptions of QOL   LISREL1

VARIANCES AND COVARIANCES

        ETA - ETA

                  ETA 1       ETA 2       ETA 3       ETA 4
               --------    --------    --------    --------
   ETA 1          0.265
   ETA 2          0.118       0.326
   ETA 3          0.088       0.263       0.443
   ETA 4          0.520       0.618       0.848       3.762

        ETA - KSI

                  KSI 1       KSI 2       KSI 3       KSI 4
               --------    --------    --------    --------
   ETA 1          0.055      -0.023      -0.007       0.256
   ETA 2          0.067      -0.008      -0.011       0.473
   ETA 3          0.118      -0.001      -0.026       3.078
   ETA 4          0.310      -0.487      -0.081       6.033

        Y - ETA

                  ETA 1       ETA 2       ETA 3       ETA 4
               --------    --------    --------    --------
outlnpt           0.265       0.118       0.088       0.520
healthpt          0.118       0.326       0.263       0.618
livingpt          0.028       0.111       0.176       0.214
metpt             0.088       0.263       0.443       0.848
prespt            0.487       0.638       0.882       2.707
pttte             0.062       0.050       0.064       0.448
ptiwb             0.515       0.480       0.530       4.728

        Y - KSI

                  KSI 1       KSI 2       KSI 3       KSI 4
               --------    --------    --------    --------
outlnpt           0.055      -0.023      -0.007       0.256
healthpt          0.067      -0.008      -0.011       0.473
livingpt          0.048      -0.028      -0.016       1.444
metpt             0.118      -0.001      -0.026       3.078
prespt            0.280      -0.487      -0.081       6.887
pttte             0.027      -0.088      -0.010       0.784
ptiwb             0.488      -0.520      -0.089       7.377

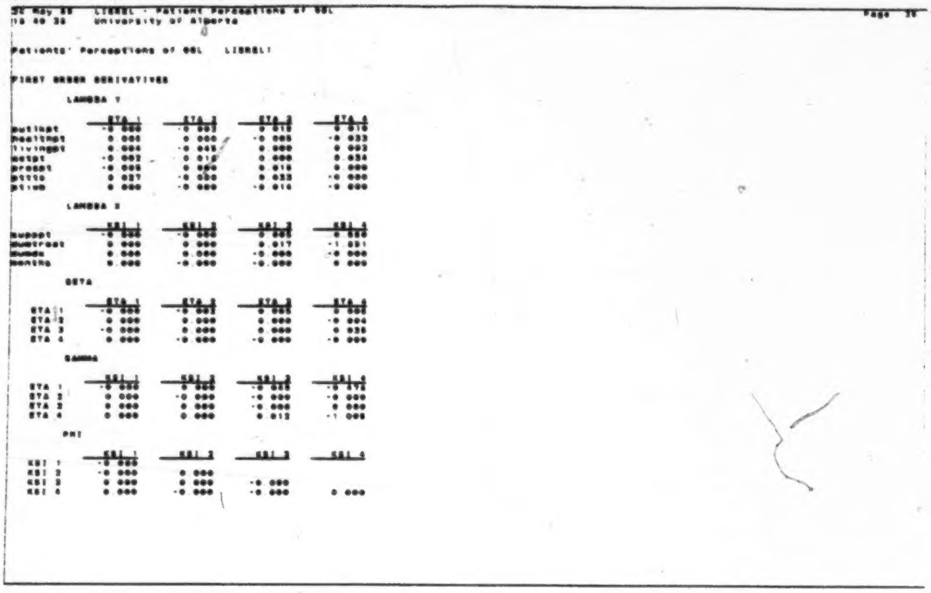
        X - ETA

                  ETA 1       ETA 2       ETA 3       ETA 4
               --------    --------    --------    --------
supppt            0.055       0.067       0.118       0.310
sumtreat         -0.023      -0.008      -0.001      -0.487
numdx            -0.007      -0.011      -0.026      -0.081
months            0.256       0.473       3.078       6.033
```

```
30 May 95    LISREL - Patient Perceptions of QOL                                   Page 3[illegible]
15:40:38     University of Alberta

        X - KSI

                  KSI 1       KSI 2       KSI 3       KSI 4
               --------    --------    --------    --------
supppt            0.245      -0.026      -0.026       0.256
sumtreat         -0.026       0.333       0.015      -1.773
numdx            -0.026       0.015       0.108      -2.011
months            0.256      -1.773      -2.011    1020.040
```



LISREL - Patient Perceptions of QOL
University of Alberta

Patients' Perceptions of QOL   LISREL

FIRST ORDER DERIVATIVES

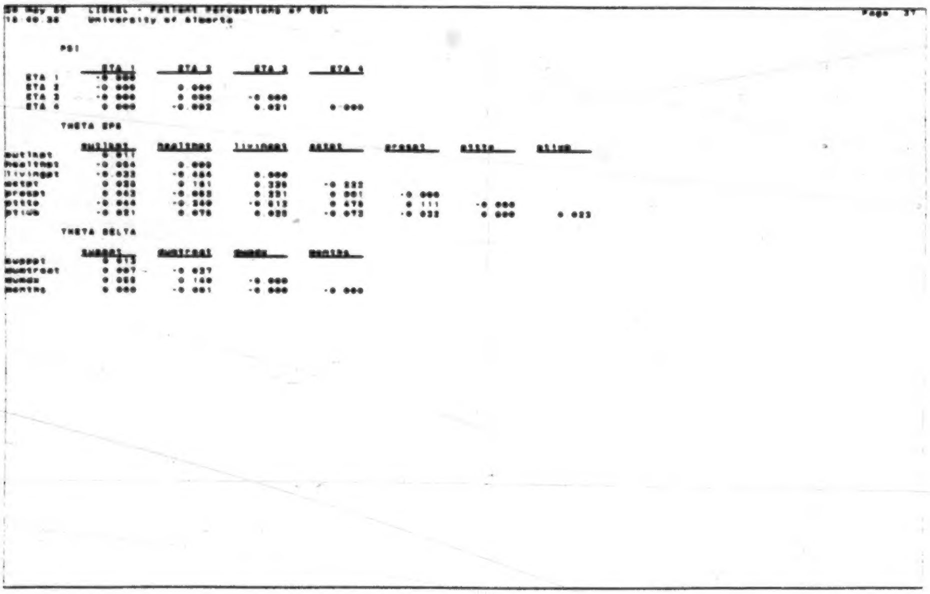
LAMBDA Y

LAMBDA X

BETA

GAMMA

PHI

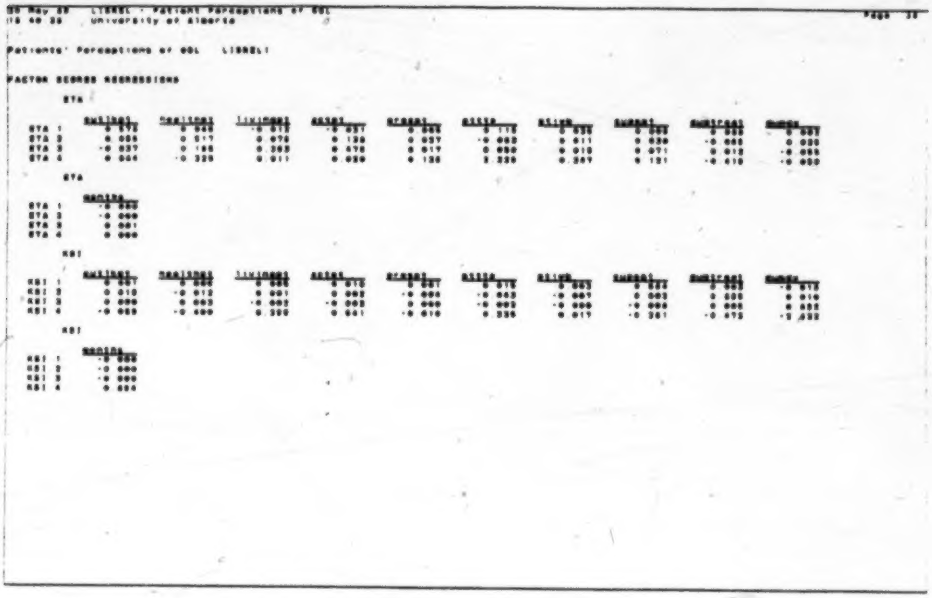


LISREL - Patient Perceptions of QOL
University of Alberta

PSI

THETA EPS

THETA DELTA



LISREL - Patient Perceptions of QOL
University of Alberta

Patients' Perceptions of QOL   LISREL1

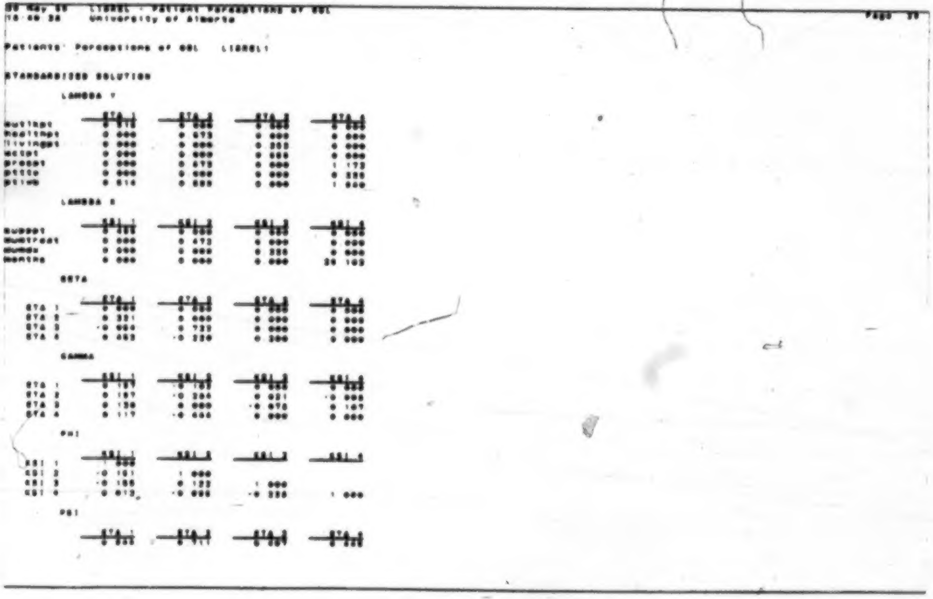
FACTOR SCORES REGRESSIONS

ETA

ETA

KSI

KSI



LISREL - Patient Perceptions of QOL
University of Alberta

Patients' Perceptions of QOL   LISREL1

STANDARDIZED SOLUTION

LAMBDA Y

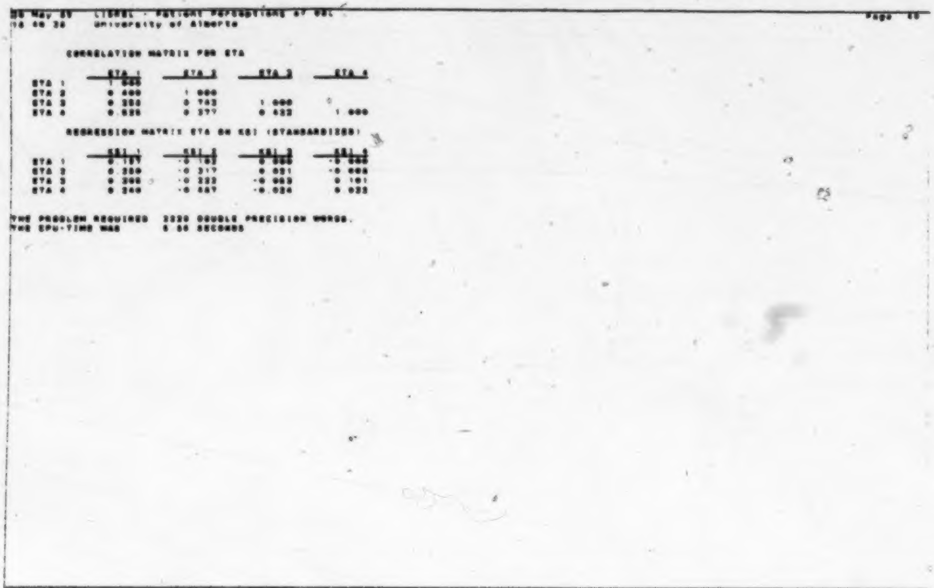
LAMBDA X

BETA

GAMMA

PHI

PSI



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26 May 89   LISREL - Patient Perceptions of QOL                                   Page 60
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        CORRELATION MATRIX FOR ETA

               ETA 1       ETA 2       ETA 3       ETA 4
 ETA 1         1.000
 ETA 2         0.400       1.000
 ETA 3         0.354       0.743       1.000
 ETA 4         0.526       0.377       0.422       1.000

        REGRESSION MATRIX ETA ON KSI (STANDARDIZED)

               KSI 1       KSI 2       KSI 3       KSI 4
 ETA 1         0.117      -0.161       0.066      -0.066
 ETA 2         0.280      -0.317       0.021      -0.008
 ETA 3         0.306      -0.222      -0.063       0.101
 ETA 4         0.240      -0.487      -0.024       0.023

THE PROBLEM REQUIRED  2328 DOUBLE PRECISION WORDS.
THE CPU-TIME WAS       5.56 SECONDS
```

```
26 May 89   LISREL - Patient Perceptions of QOL                                   Page 61
16 40 36    University of Alberta

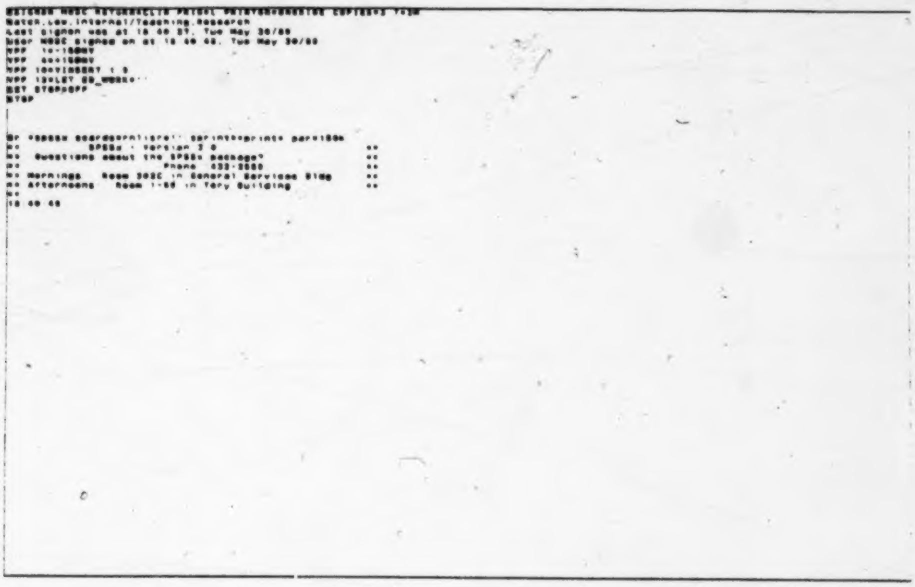
PRECEDING TASK REQUIRED       6.10 SECONDS CPU TIME,       7.38 SECONDS ELAPSED

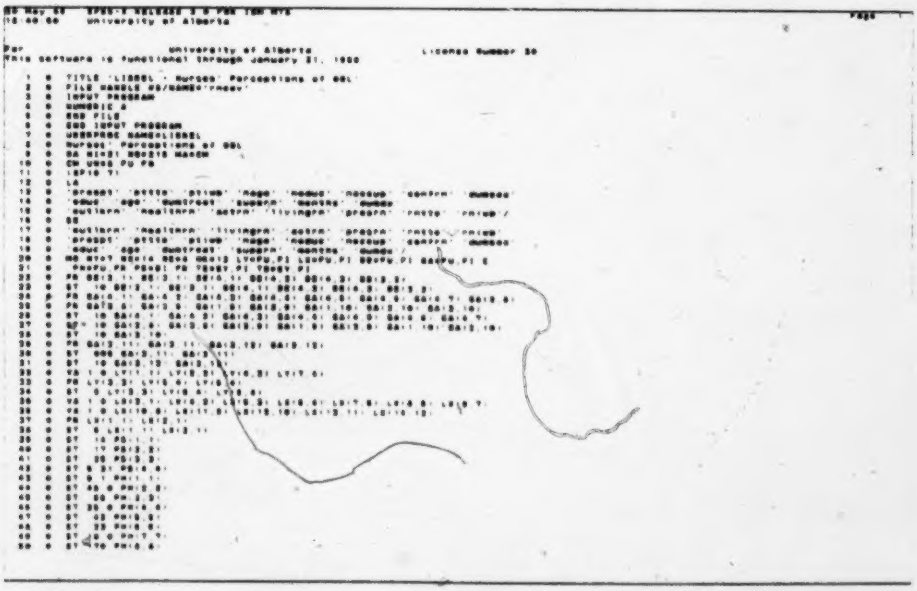
  55  0

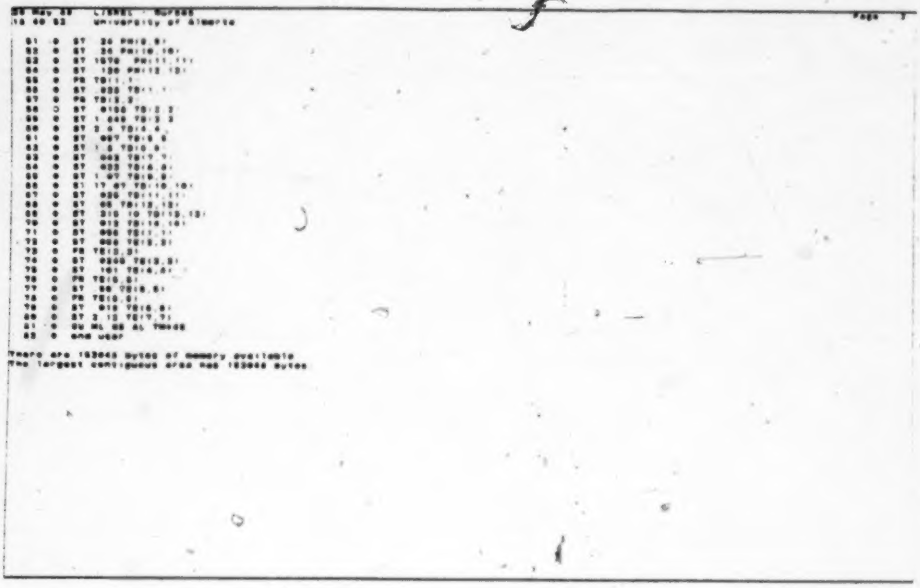
    55 COMMAND LINES READ
     0 ERRORS DETECTED
     0 WARNINGS ISSUED
     6 SECONDS CPU TIME
     8 SECONDS ELAPSED TIME
       END OF JOB
16 40 36  TAE 4SIL RC=0

** [illegible]
**          SPSSx - Version 3.0                        **
**  Questions about the SPSSx package?                 **
**                   Phone  432-3980                   **
** Mornings   Room 302E in General Services Bldg       **
** Afternoons:  Room 1-56 in Tory Building             **
**
16 40 36
```

Appendix 9: LISREL Model of Nurses' Perceptions of QOL of Patients with ESRD (Total)







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University of Alberta

There are 153048 bytes of memory available.
The largest contiguous area has 153048 bytes
```

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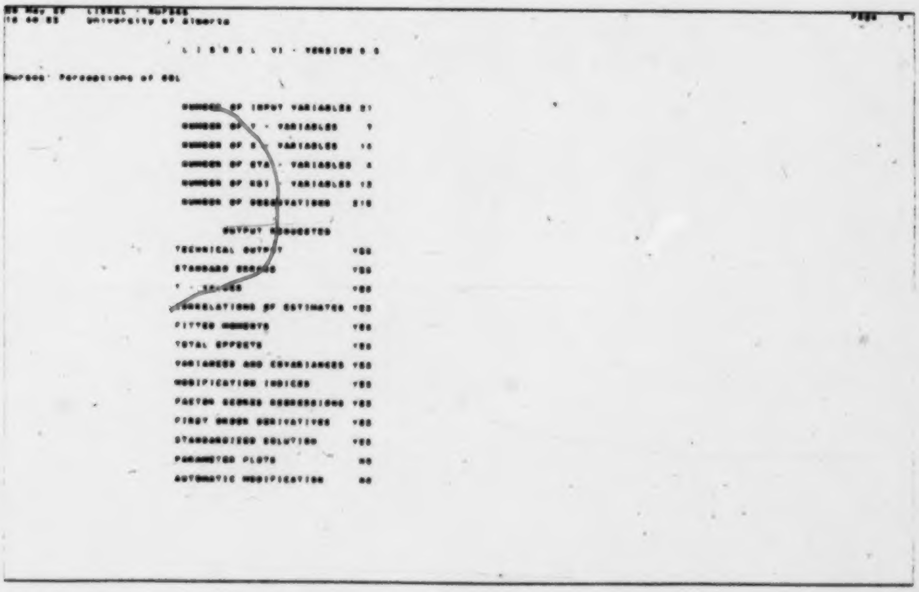
University of Alberta

                    L I S R E L  VI - VERSION 6.6
                                 BY
                    KARL G JORESKOG AND DAG SORBOM

THE FOLLOWING LISREL CONTROL LINES HAVE BEEN READ
```

```
29 May 89   LISREL - Nurses                                                Page
15 40 52    University of Alberta

ST 10.0 PH(7,7)
ST 170 PH(8,8)
ST 24 PH(9,9)
ST 24 PH(10,10)
ST 1570  PH(11,11)
ST 180 PH(12,12)
FR TD(1,1)
ST .026 TD(1,1)
FR TD(2,2)
ST .0190 TD(2,2)
ST 1.640 TD(3,3)
ST 3.4 TD(4,4)
ST .067 TD(5,5)
ST 1.6 TD(6,6)
ST .062 TD(7,7)
ST .023 TD(8,8)
ST 1.07 TD(9,9)
ST 17.07 TD(10,10)
ST .029 TD(11,11)
ST .06 TD(12,12)
ST 315.10 TD(13,13)
ST .013 TD(14,14)
ST .066 TE(1,1)
ST .060 TE(2,2)
FR TE(3,3)
ST .0245 TE(3,3)
ST .101 TE(4,4)
FR TE(5,5)
ST 50 TE(5,5)
FR TE(6,6)
ST .016 TE(6,6)
ST 2.13 TE(7,7)
OU ML NS AL TM=60
```



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29 May 89   LISREL - Nurses                                                Page
15 40 52    University of Alberta

                         L I S R E L  VI - VERSION 6.6

Nurses' Perceptions of QOL

                         NUMBER OF INPUT VARIABLES 21
                         NUMBER OF Y - VARIABLES    7
                         NUMBER OF X - VARIABLES   14
                         NUMBER OF ETA - VARIABLES  4
                         NUMBER OF KSI - VARIABLES 13
                         NUMBER OF OBSERVATIONS   216

                              OUTPUT REQUESTED
                        TECHNICAL OUTPUT              YES
                        STANDARD ERRORS               YES
                        T - VALUES                    YES
                        CORRELATIONS OF ESTIMATES     YES
                        FITTED MOMENTS                YES
                        TOTAL EFFECTS                 YES
                        VARIANCES AND COVARIANCES     YES
                        MODIFICATION INDICES          YES
                        FACTOR SCORES REGRESSIONS     YES
                        FIRST ORDER DERIVATIVES       YES
                        STANDARDIZED SOLUTION         YES
                        PARAMETER PLOTS                NO
                        AUTOMATIC MODIFICATION         NO
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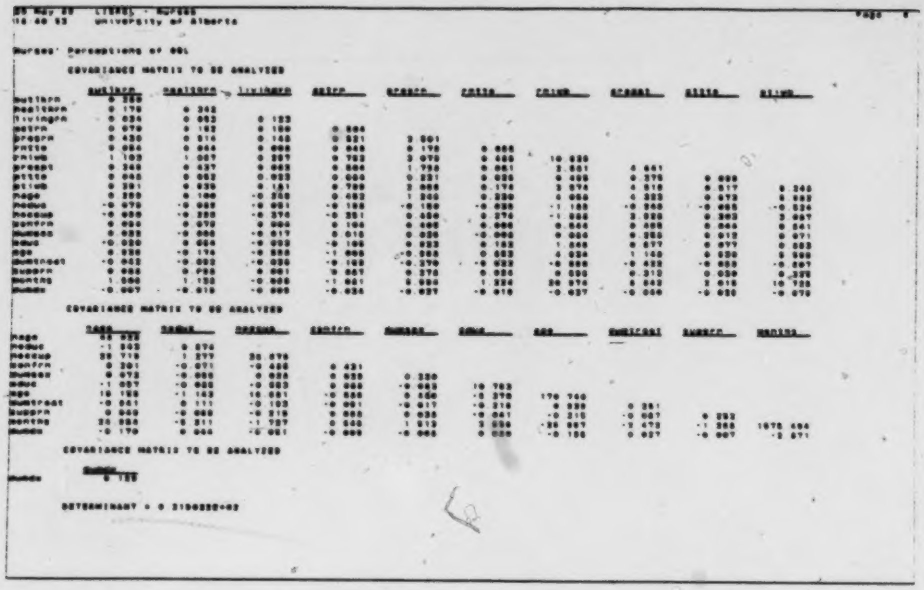

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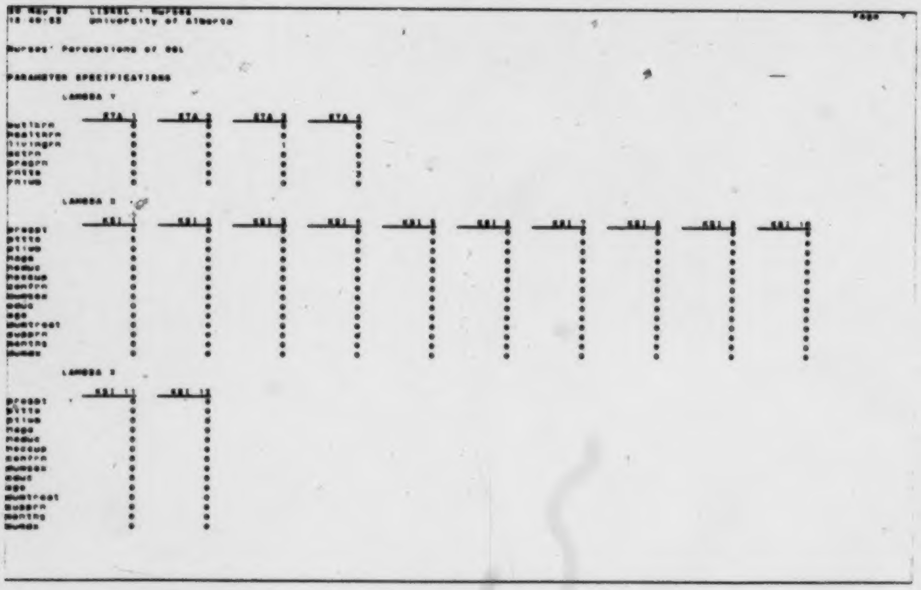
University of Alberta

Nurses' Perceptions of QOL

        COVARIANCE MATRIX TO BE ANALYZED

        COVARIANCE MATRIX TO BE ANALYZED

        COVARIANCE MATRIX TO BE ANALYZED
```



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University of Alberta

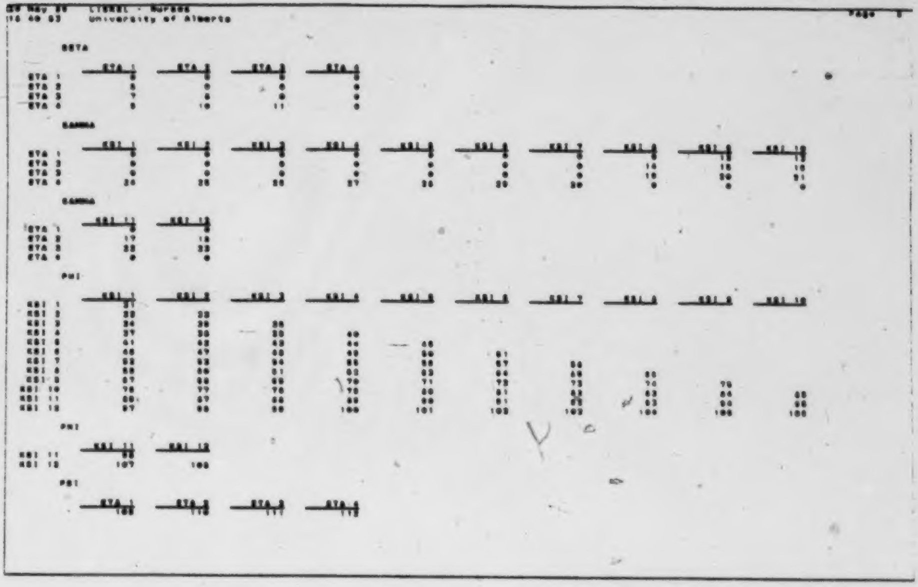
Nurses' Perceptions of QOL

PARAMETER SPECIFICATIONS

        LAMBDA Y

        LAMBDA X

        LAMBDA X
```



LISREL - Nurses
University of Alberta

BETA

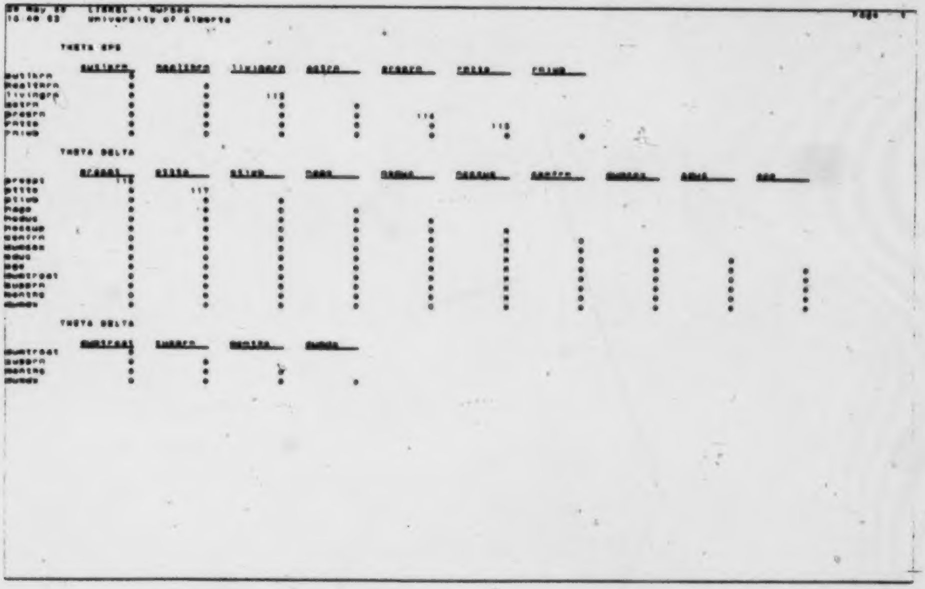
GAMMA

GAMMA

PHI

PHI

PSI

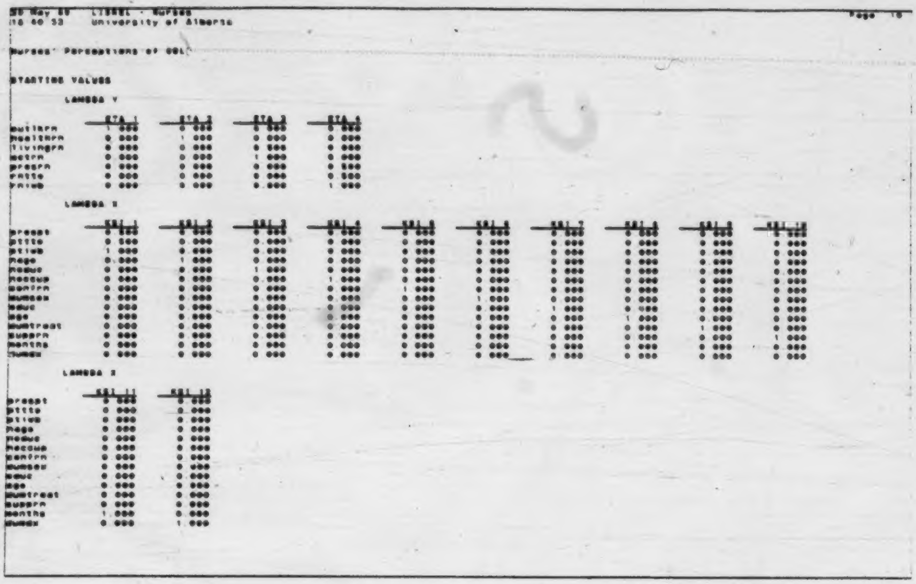


LISREL - Nurses
University of Alberta

THETA EPS

THETA DELTA

THETA DELTA



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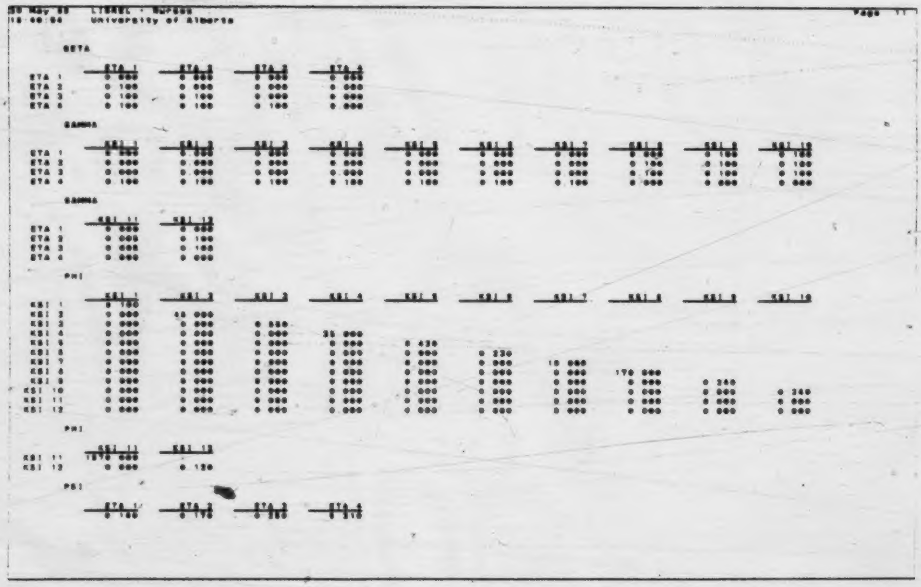
Nurses' Perceptions of QOL

STARTING VALUES

LAMBDA Y

LAMBDA X

LAMBDA X



LISREL - Nurses
University of Alberta

BETA

GAMMA

GAMMA

PHI

PHI

PSI

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[illegible] May [illegible]   LISREL - Nurses                                                        Page 12
[illegible]        University of Alberta

       THETA EPS

           [illegible]  [illegible]  livingrn   [illegible]  [illegible]  [illegible]  [illegible]
[illegible]   [illegible]
[illegible]   0.000      [illegible]
livingrn      0.000      0.000      [illegible]
[illegible]   0.000      0.000      0.000      0.101
[illegible]   0.000      0.000      0.000      0.000      0.000
[illegible]   0.000      0.000      0.000      0.000      0.000      0.010
[illegible]   0.000      0.000      0.000      0.000      0.000      0.000      1.120

       THETA DELTA

           [illegible]  [illegible]  [illegible]  page  [illegible]  [illegible]  [illegible]  [illegible]  [illegible]  age
[illegible]   [illegible]
[illegible]   0.000      0.020
[illegible]   0.000      0.000      1.000
page          0.000      0.000      0.000      1.000
[illegible]   0.000      0.000      0.000      0.000      0.057
[illegible]   0.000      0.000      0.000      0.000      0.000      1.000
[illegible]   0.000      0.000      0.000      0.000      0.000      0.000      0.003
[illegible]   0.000      0.000      0.000      0.000      0.000      0.000      0.000      0.023
[illegible]   0.000      0.000      0.000      0.000      0.000      0.000      0.000      0.000      1.070
age           0.000      0.000      0.000      0.000      0.000      0.000      0.000      0.000      0.000      17.070
numtreat      0.000      0.000      0.000      0.000      0.000      0.000      0.000      0.000      0.000      0.000
supprn        0.000      0.000      0.000      0.000      0.000      0.000      0.000      0.000      0.000      0.000
months        0.000      0.000      0.000      0.000      0.000      0.000      0.000      0.000      0.000      0.000
[illegible]   0.000      0.000      0.000      0.000      0.000      0.000      0.000      0.000      0.000      0.000

       THETA DELTA

           numtreat   supprn     months     [illegible]
numtreat      [illegible]
supprn        0.000      0.050
months        0.000      0.000    315.100
[illegible]   0.000      0.000      0.000      0.012

       SQUARED MULTIPLE CORRELATIONS FOR Y - VARIABLES

           [illegible]  [illegible]  livingrn   [illegible]  [illegible]  [illegible]  [illegible]
           [illegible]  [illegible]  [illegible]  [illegible]  [illegible]  [illegible]  [illegible]

       TOTAL COEFFICIENT OF DETERMINATION FOR Y - VARIABLES IS  1.000

       SQUARED MULTIPLE CORRELATIONS FOR X - VARIABLES

           [illegible]  [illegible]  [illegible]  page  [illegible]  [illegible]  [illegible]  [illegible]  [illegible]  age
           [illegible]  [illegible]  [illegible]  [illegible]  [illegible]  [illegible]  [illegible]  [illegible]  [illegible]  [illegible]

       SQUARED MULTIPLE CORRELATIONS FOR X - VARIABLES

           numtreat   supprn     months     [illegible]
           [illegible]  [illegible]  [illegible]  [illegible]
```

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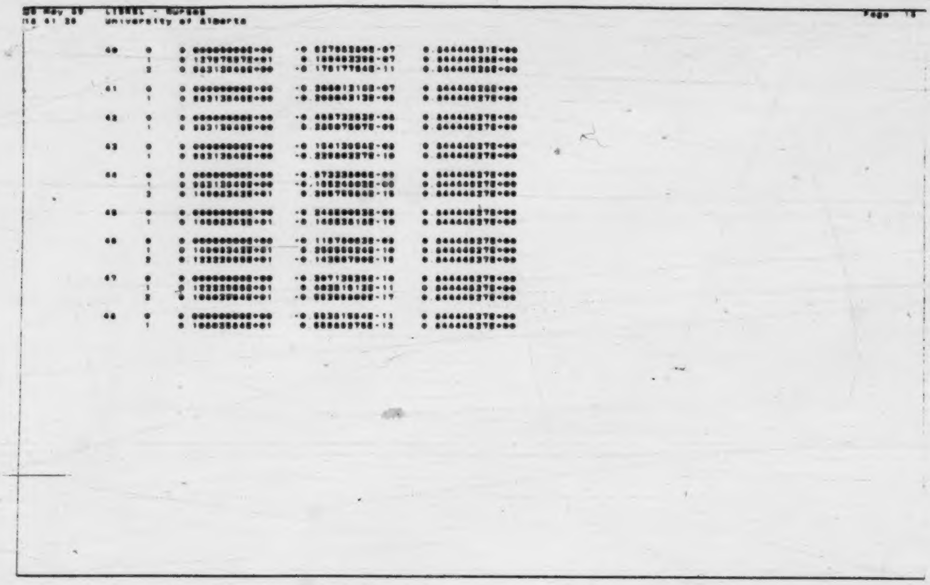
[illegible] May [illegible]   LISREL - Nurses                                                        Page 13
[illegible]        University of Alberta

       TOTAL COEFFICIENT OF DETERMINATION FOR X - VARIABLES IS  1.000

       SQUARED MULTIPLE CORRELATIONS FOR STRUCTURAL EQUATIONS

           ETA 1      ETA 2      ETA 3      ETA 4
           0.033      0.011      [illegible]  0.176

       TOTAL COEFFICIENT OF DETERMINATION FOR STRUCTURAL EQUATIONS IS  [illegible]
```



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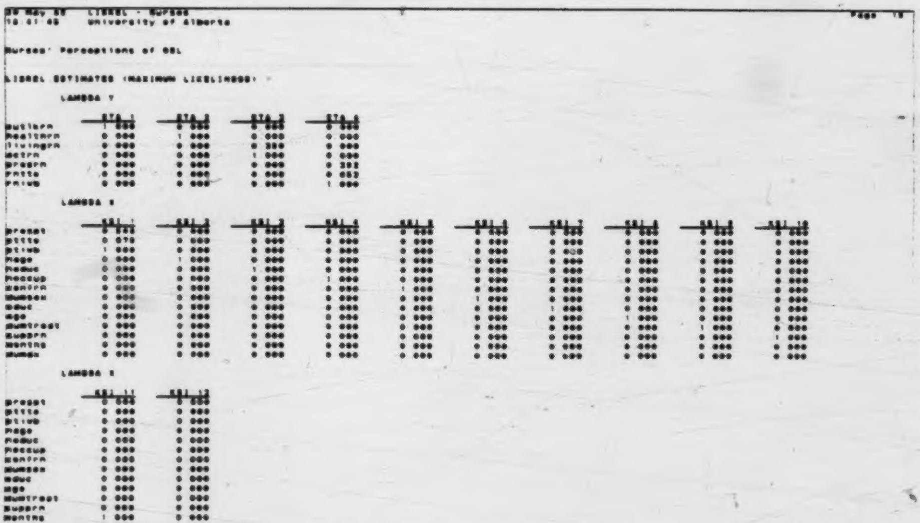
University of Alberta



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University of Alberta

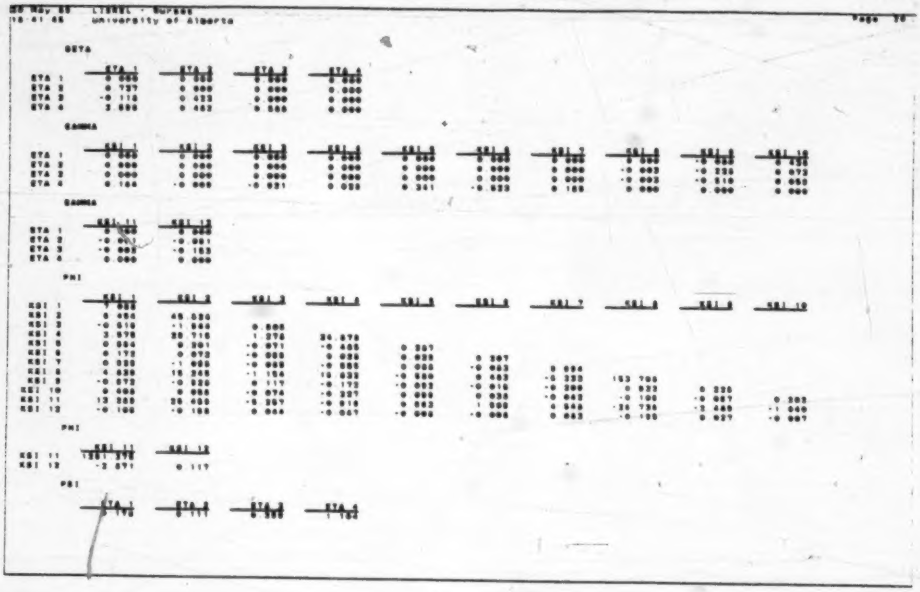
Nurses' Perceptions of QOL

LISREL ESTIMATES (MAXIMUM LIKELIHOOD)

LAMBDA Y

LAMBDA X

LAMBDA X



LISREL - Nurses

University of Alberta

BETA

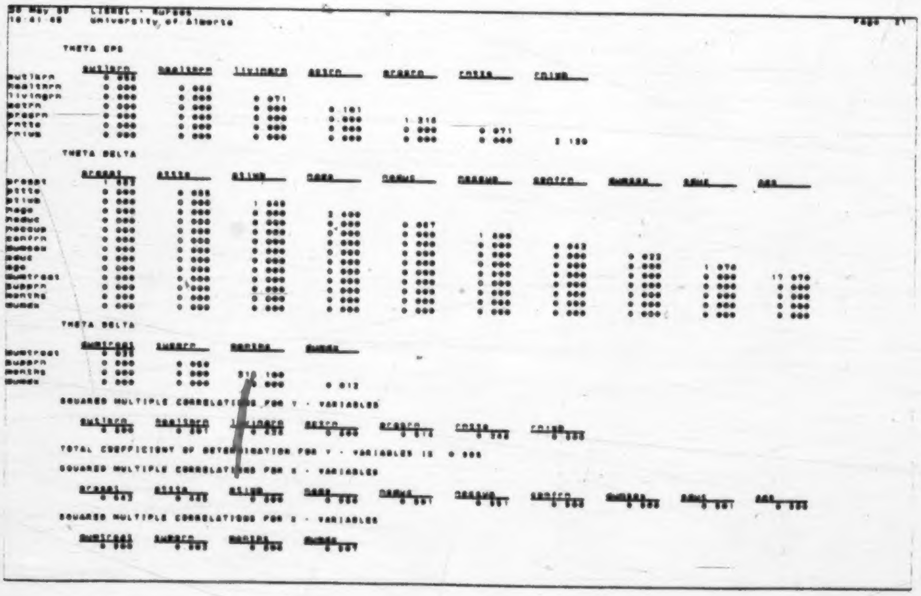
GAMMA

GAMMA

PHI

PHI

PSI



LISREL - Nurses

University of Alberta

THETA EPS

THETA DELTA

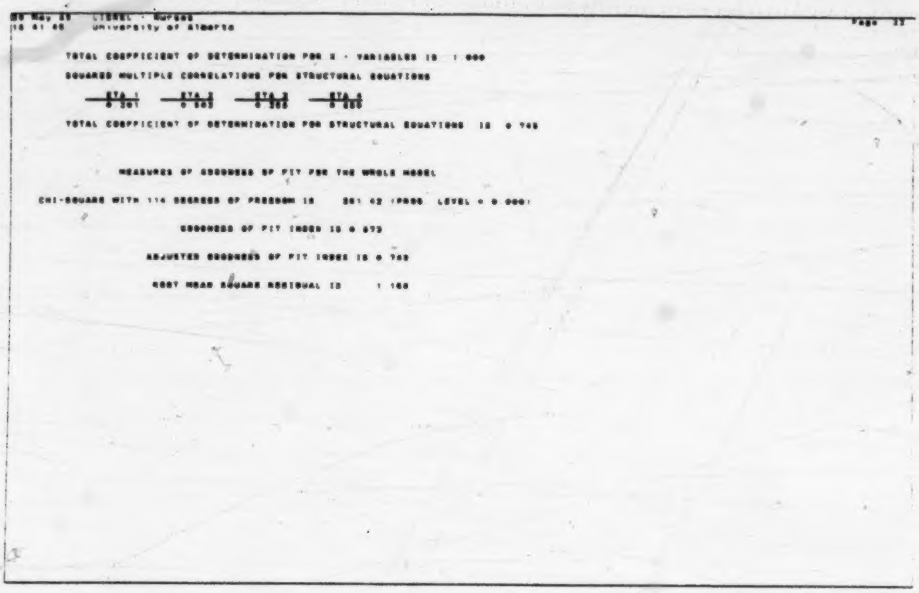
THETA DELTA

SQUARED MULTIPLE CORRELATIONS FOR Y - VARIABLES

TOTAL COEFFICIENT OF DETERMINATION FOR Y - VARIABLES IS

SQUARED MULTIPLE CORRELATIONS FOR X - VARIABLES

SQUARED MULTIPLE CORRELATIONS FOR X - VARIABLES



30 May 88 LISREL - Nurses
16:41:45 University of Alberta

TOTAL COEFFICIENT OF DETERMINATION FOR X - VARIABLES IS 1.000

SQUARED MULTIPLE CORRELATIONS FOR STRUCTURAL EQUATIONS

ETA 1 ETA 2 ETA 3 ETA 4

TOTAL COEFFICIENT OF DETERMINATION FOR STRUCTURAL EQUATIONS IS 0.748

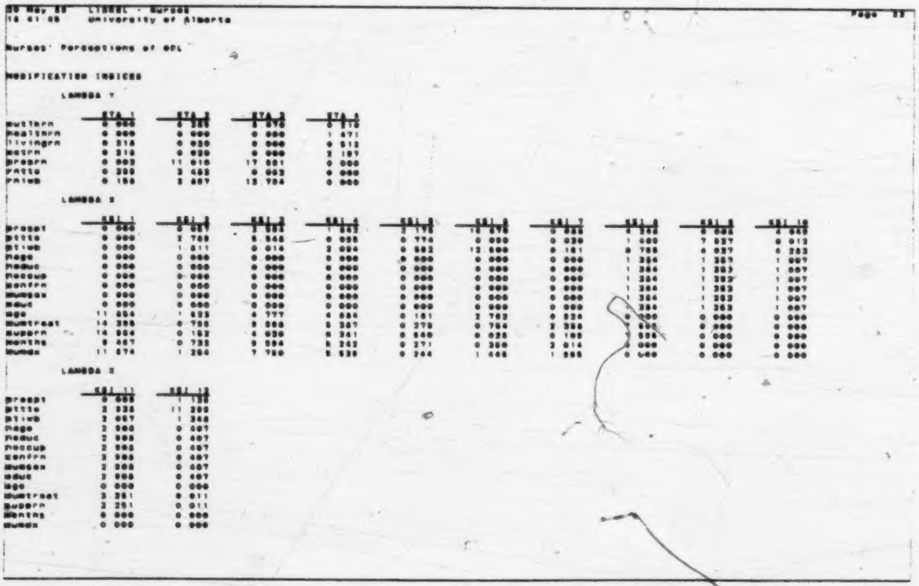
MEASURES OF GOODNESS OF FIT FOR THE WHOLE MODEL

CHI-SQUARE WITH 114 DEGREES OF FREEDOM IS 281.42 (PROB. LEVEL = 0.000)

GOODNESS OF FIT INDEX IS 0.873

ADJUSTED GOODNESS OF FIT INDEX IS 0.789

ROOT MEAN SQUARE RESIDUAL IS 1.168



30 May 88 LISREL - Nurses
16:41:45 University of Alberta

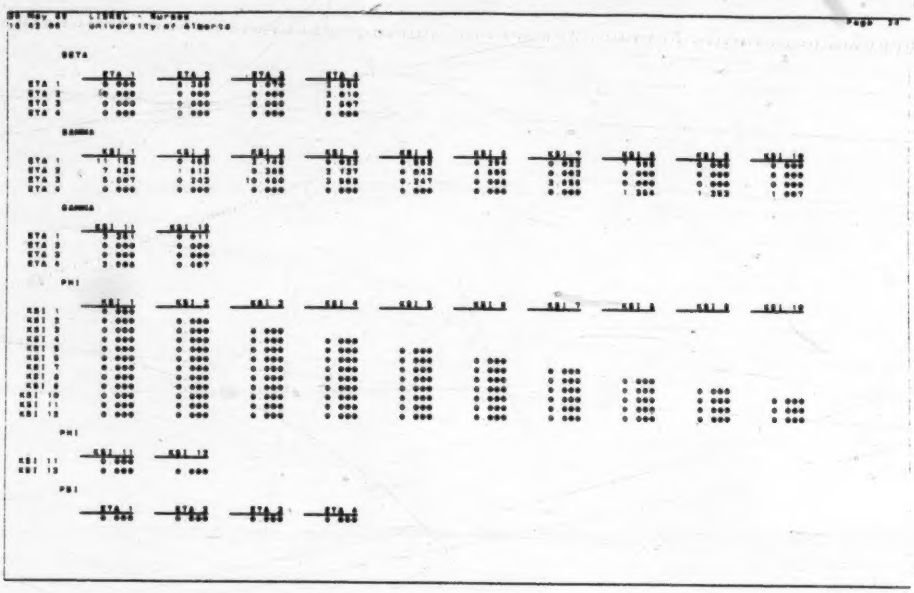
Nurses' Perceptions of QPL

MODIFICATION INDICES

LAMBDA Y

LAMBDA X

LAMBDA X



LISREL - Nurses
University of Alberta

BETA

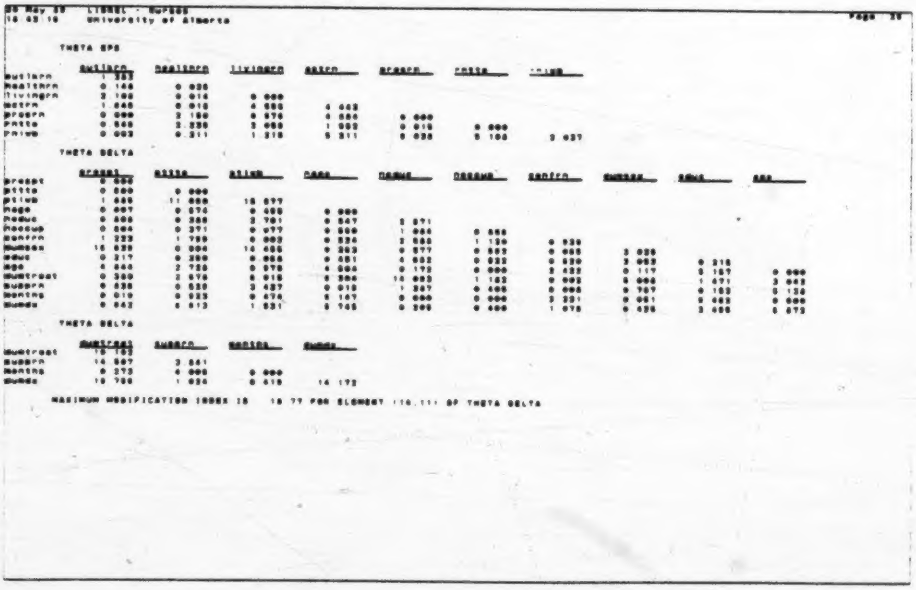
GAMMA

GAMMA

PHI

PHI

PSI



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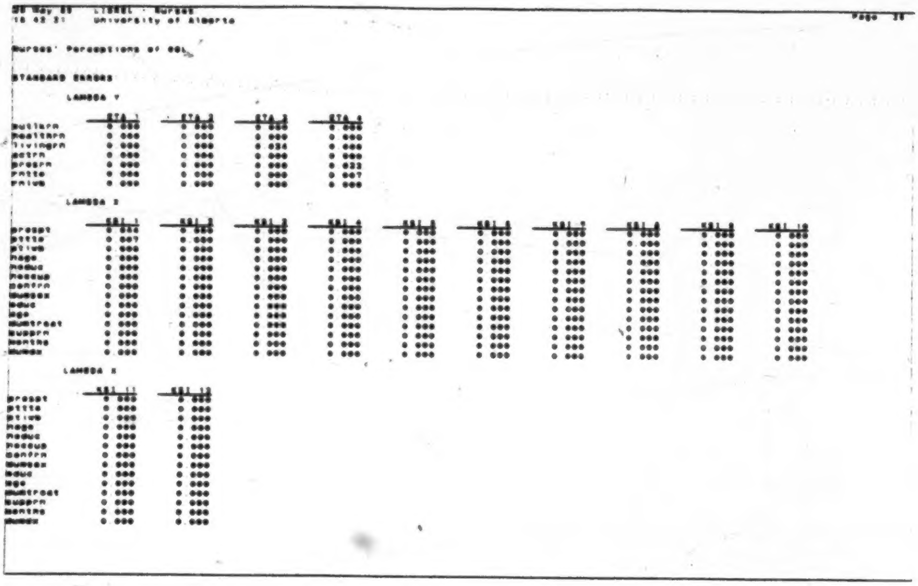
University of Alberta

THETA EPS

THETA DELTA

THETA DELTA

MAXIMUM MODIFICATION INDEX IS 16.77 FOR ELEMENT (10,11) OF THETA DELTA



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University of Alberta

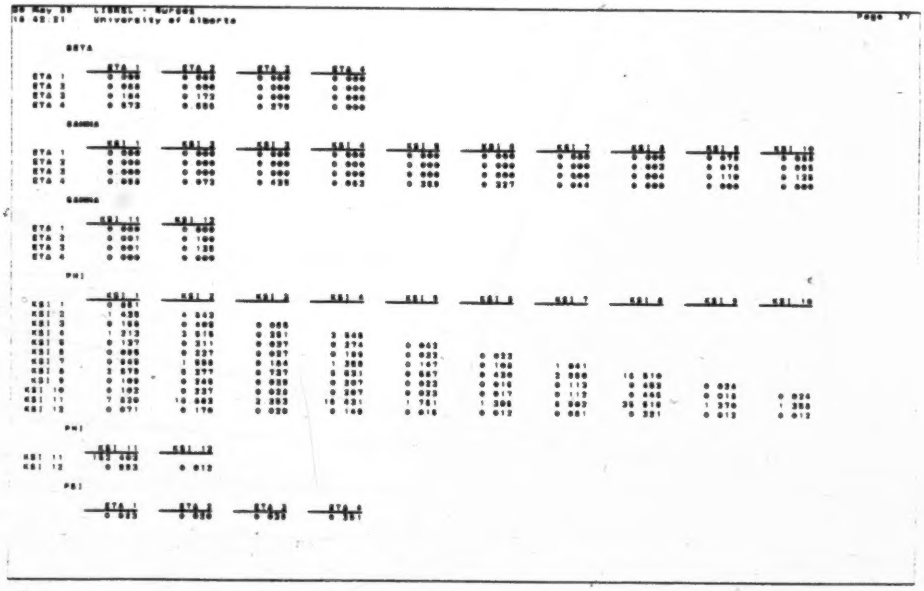
Nurses' Perceptions of QOL

STANDARD ERRORS

     LAMBDA Y

     LAMBDA X

     LAMBDA X
```



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LISREL - Nurses
University of Alberta

     BETA

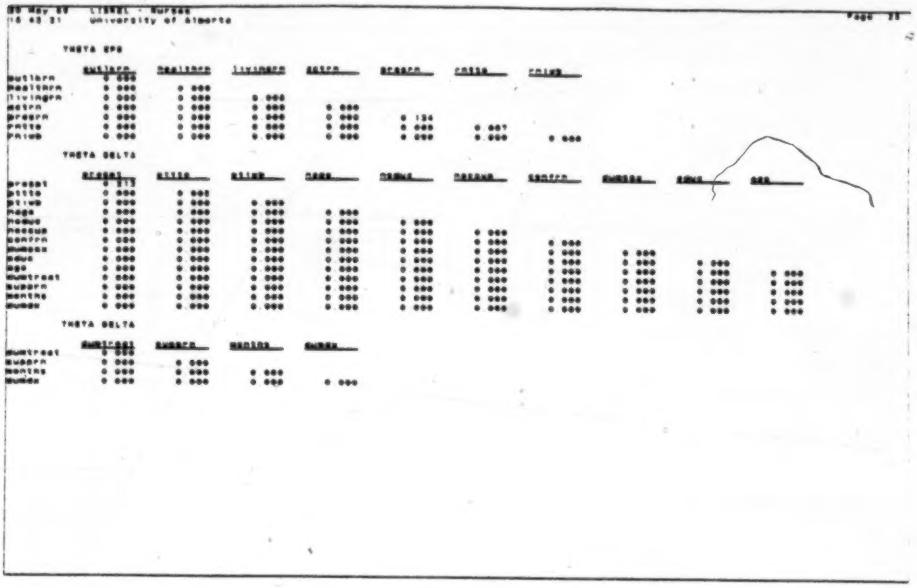
     GAMMA

     GAMMA

     PHI

     PHI

     PSI
```



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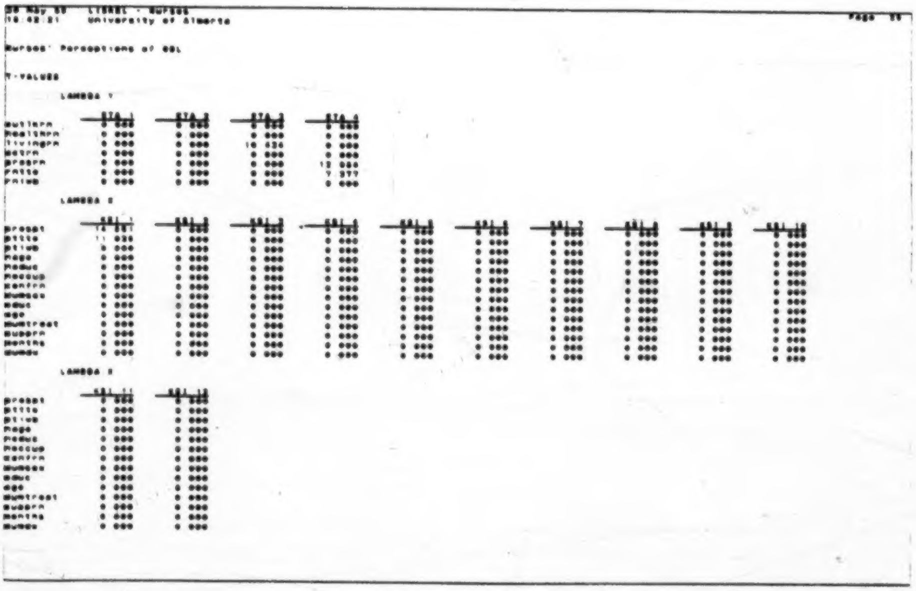
THETA EPS

THETA DELTA

THETA DELTA



LISREL - Nurses
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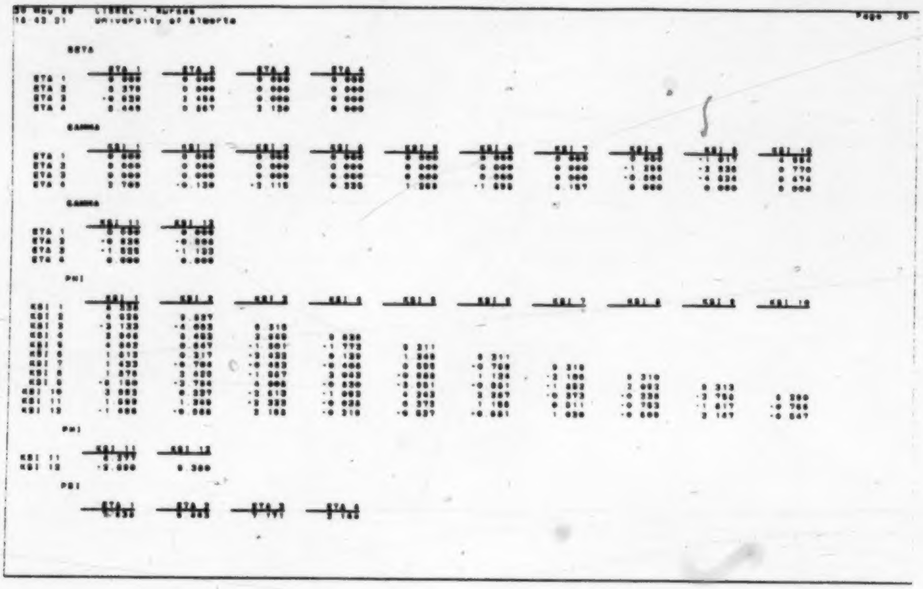
Nurses' Perceptions of QOL

T-VALUES

LAMBDA Y

LAMBDA X

LAMBDA X



University of Alberta

BETA

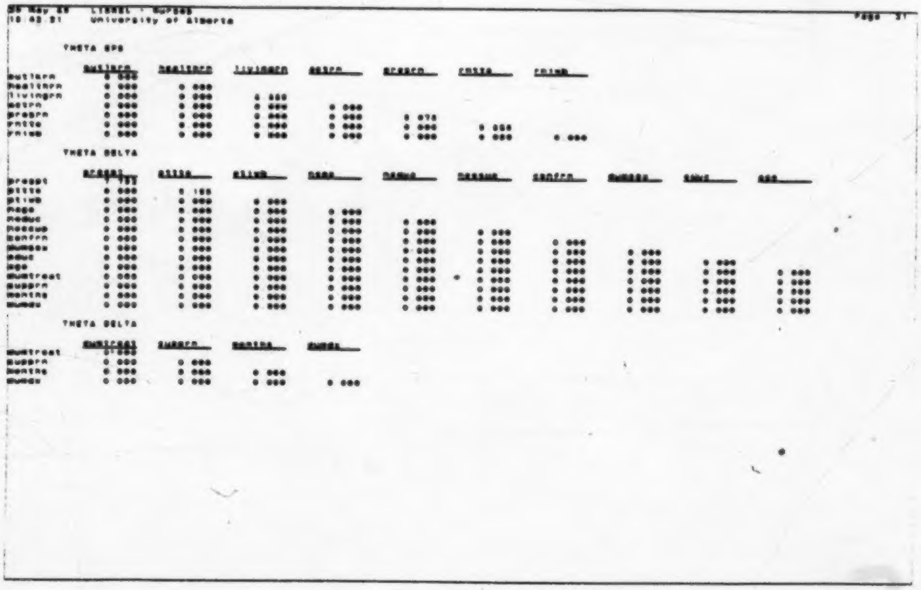
GAMMA

GAMMA

PHI

PHI

PSI

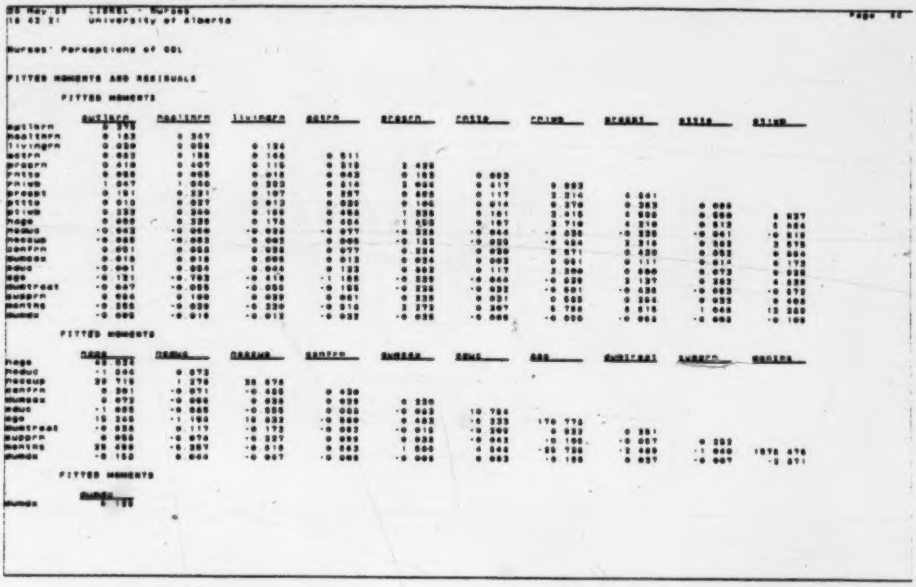


University of Alberta

THETA EPS

THETA DELTA

THETA DELTA



LISREL - Nurses
University of Alberta

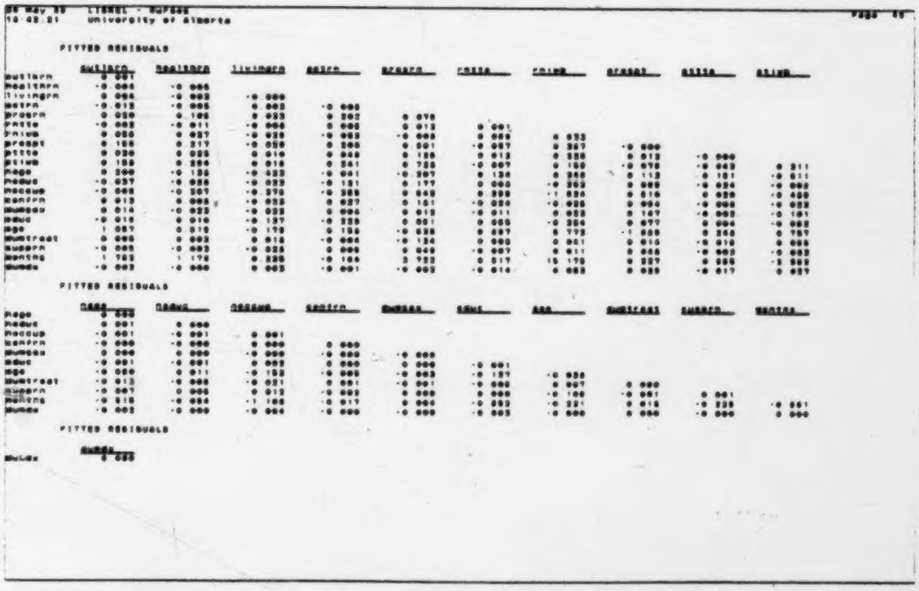
Nurses' Perceptions of QOL

FITTED MOMENTS AND RESIDUALS

FITTED MOMENTS

FITTED MOMENTS

FITTED MOMENTS

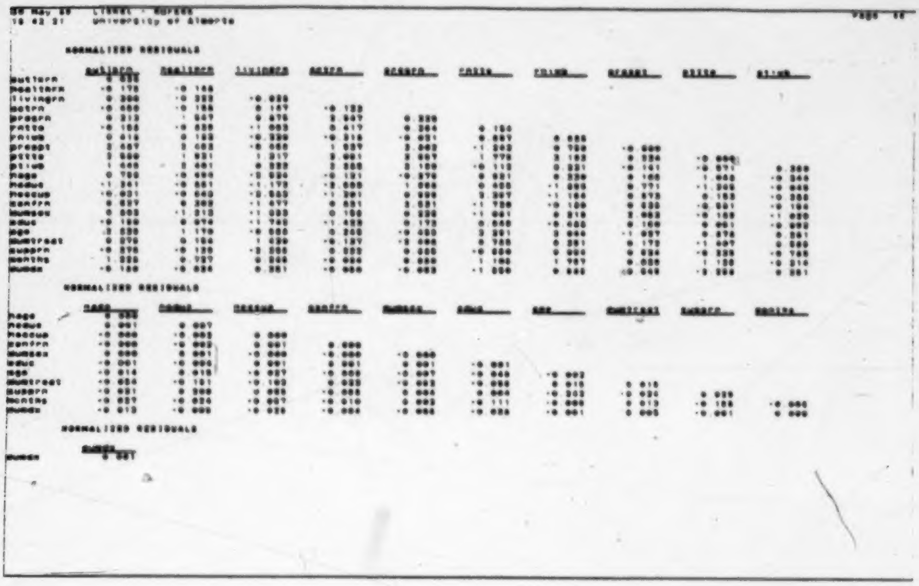


LISREL - Nurses
University of Alberta

FITTED RESIDUALS

FITTED RESIDUALS

FITTED RESIDUALS



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                LISREL - Nurses
                University of Alberta

          NORMALIZED RESIDUALS

          NORMALIZED RESIDUALS

          NORMALIZED RESIDUALS
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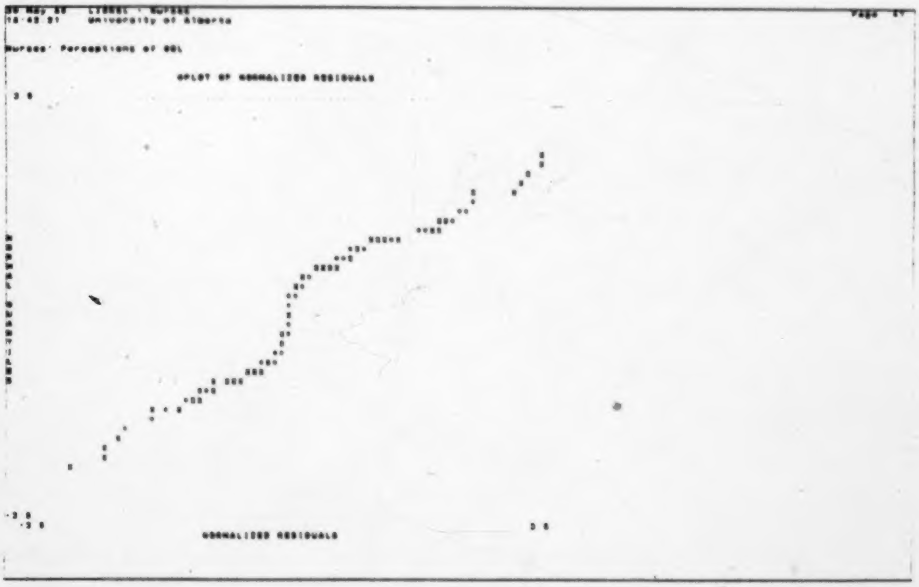

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                LISREL - Nurses
                University of Alberta

Nurses' Perceptions of QOL

                    QPLOT OF NORMALIZED RESIDUALS
 3.5

-3.5
  -3.5          NORMALIZED RESIDUALS                  3.5
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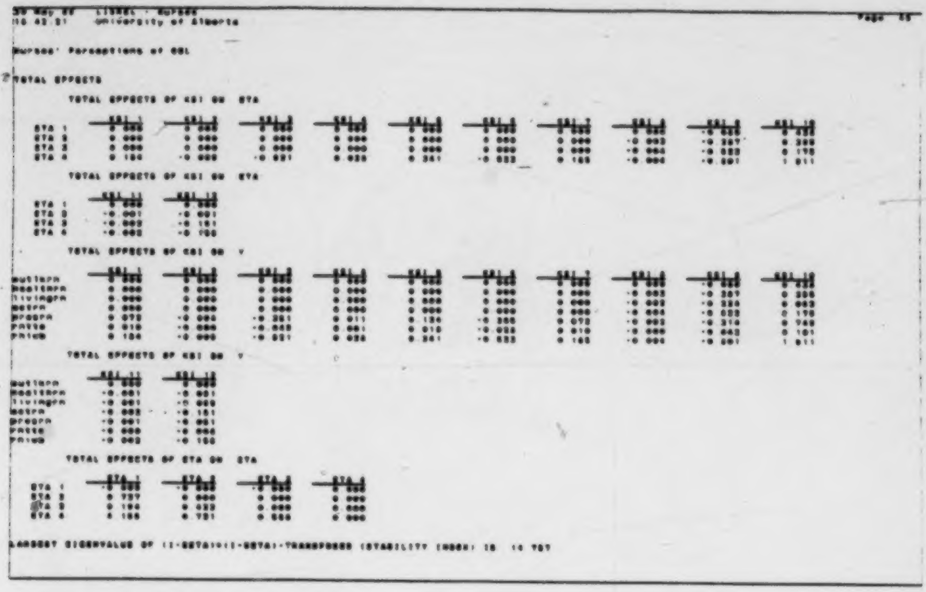

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LISREL - Nurses
University of Alberta

Nurses' Perceptions of QWL

TOTAL EFFECTS

        TOTAL EFFECTS OF KSI ON ETA

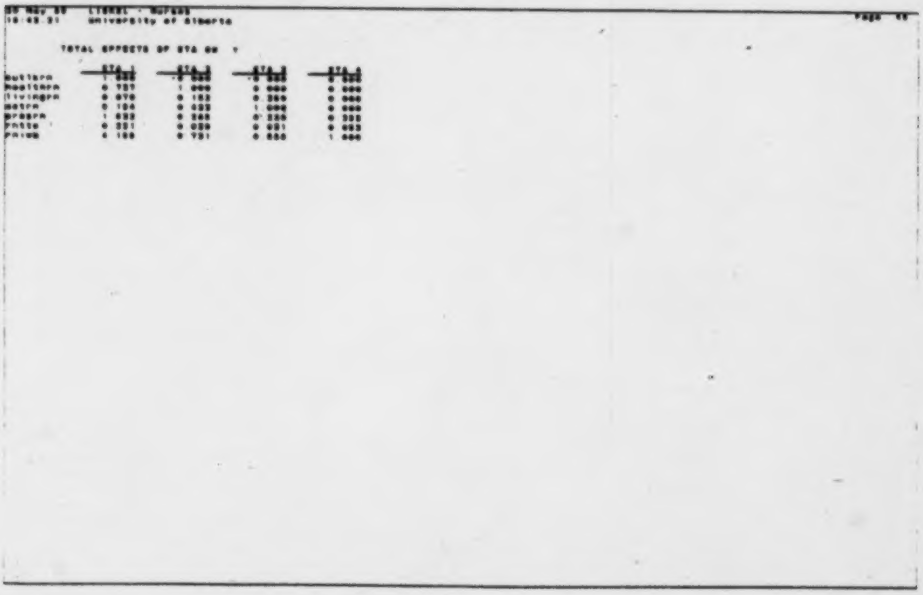
        TOTAL EFFECTS OF KSI ON ETA

        TOTAL EFFECTS OF KSI ON Y

        TOTAL EFFECTS OF KSI ON Y

        TOTAL EFFECTS OF ETA ON ETA

LARGEST EIGENVALUE OF (I-BETA)*(I-BETA)-TRANSPOSED (STABILITY INDEX) IS
```



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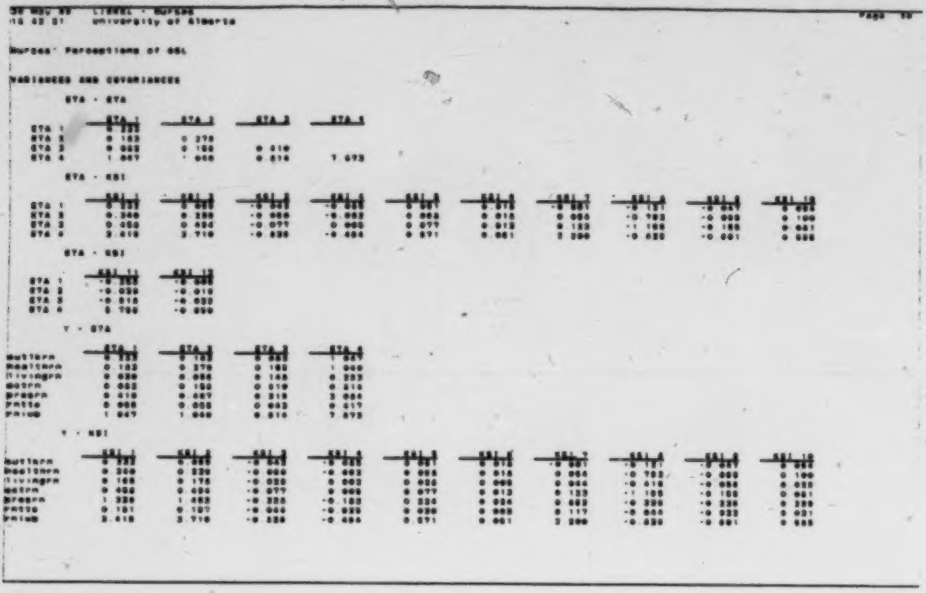
LISREL - Nurses
University of Alberta

        TOTAL EFFECTS OF ETA ON Y
```


University of Alberta

Nurses' Perceptions of

VARIANCES AND COVARIANCES

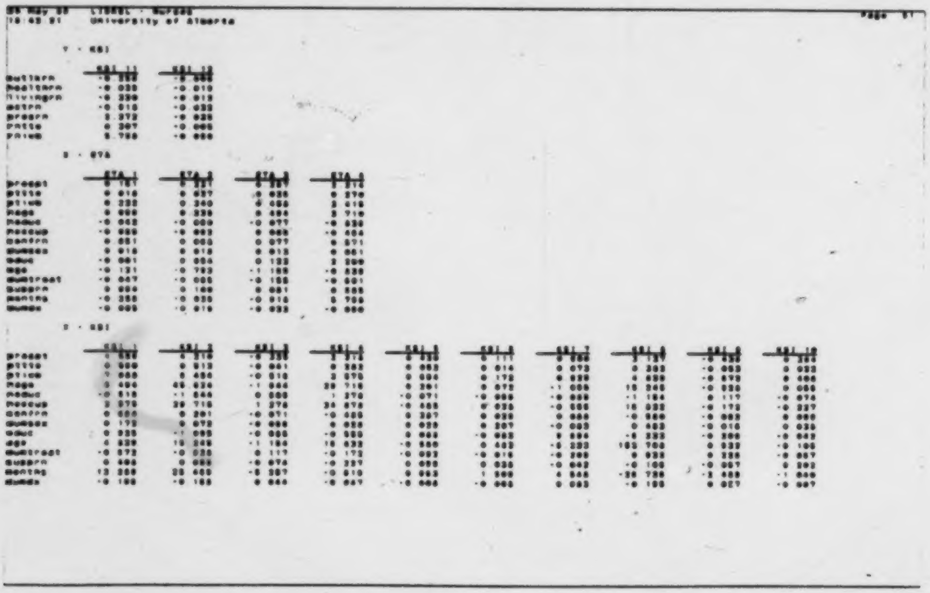
ETA - ETA

ETA - KSI

ETA - KSI

Y - ETA

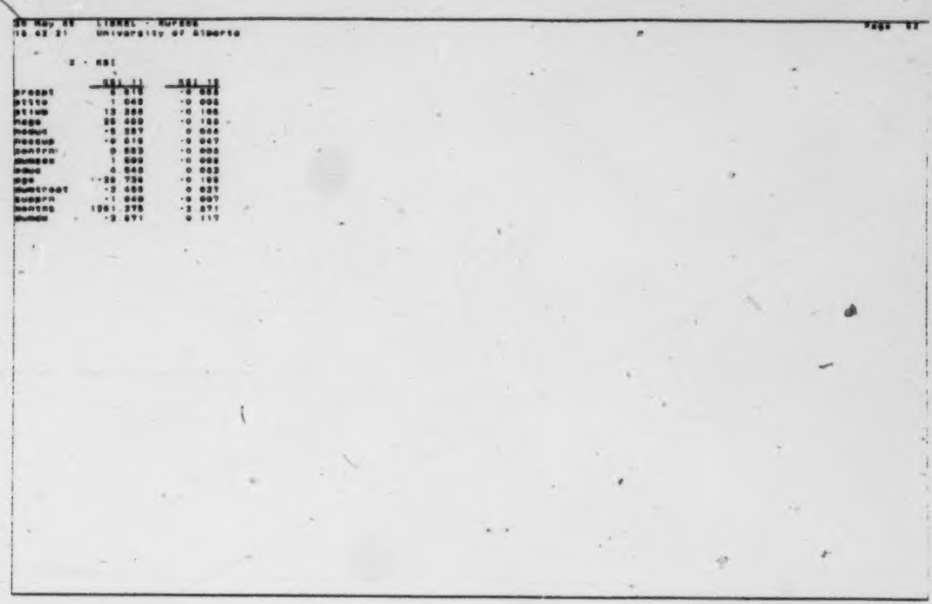
Y - KSI

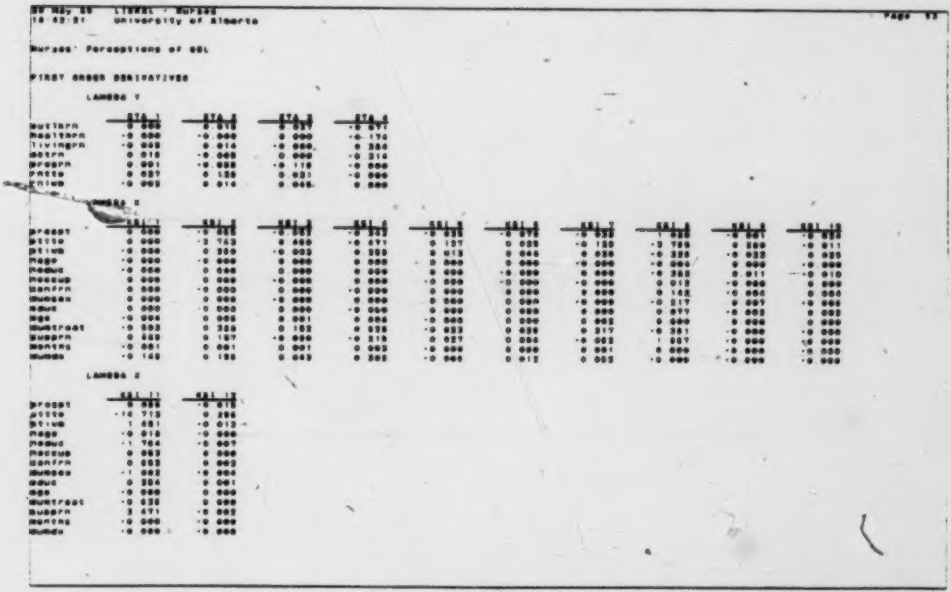

University of Alberta

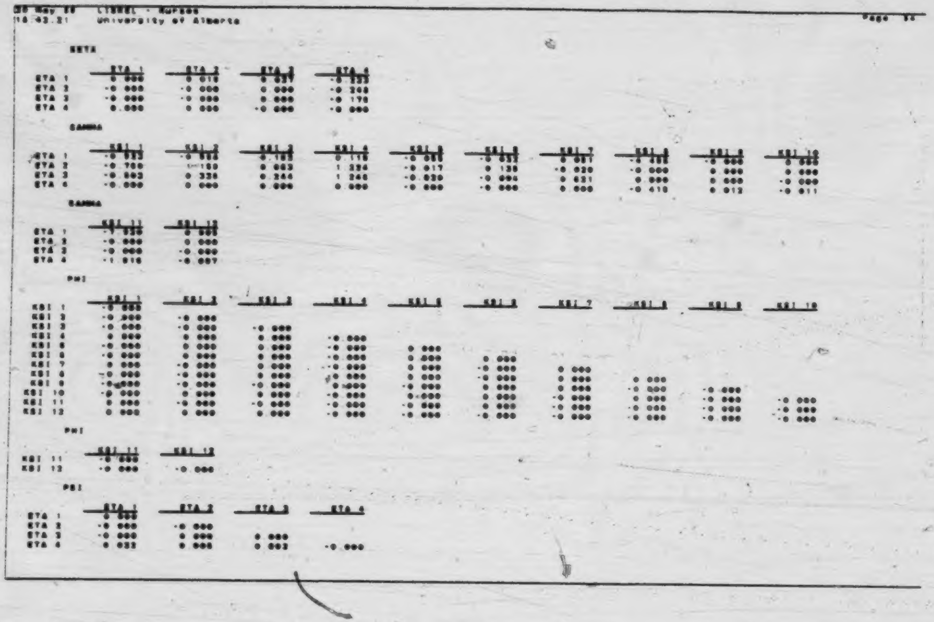
Y - KSI

X - ETA

X - KSI







University of Alberta

BETA

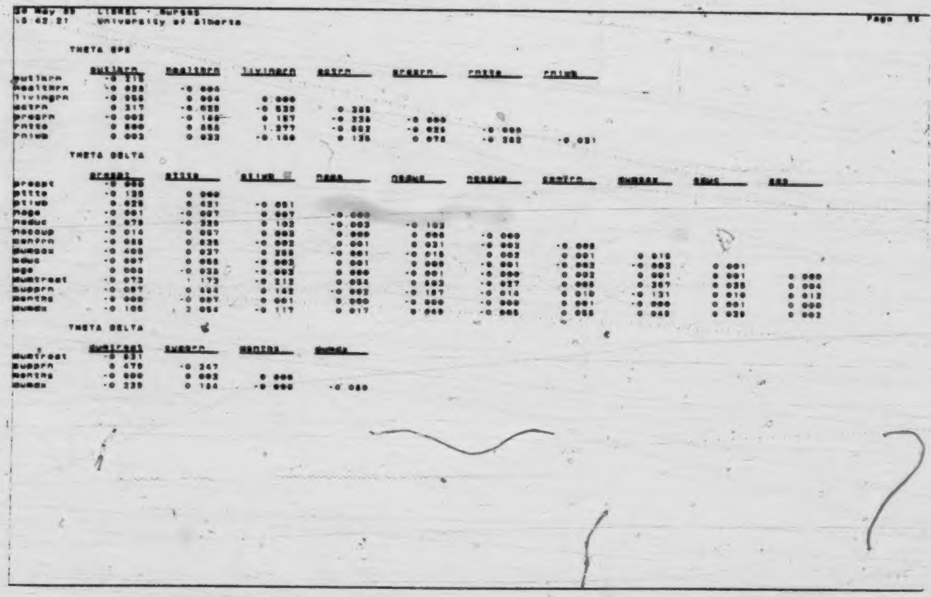
GAMMA

GAMMA

PHI

PHI

PSI

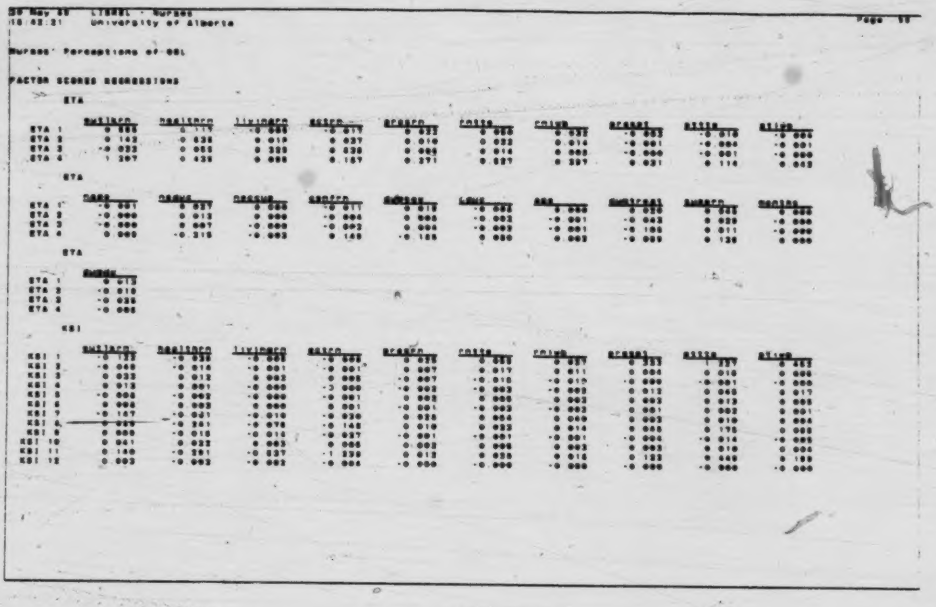


University of Alberta

THETA EPS

THETA DELTA

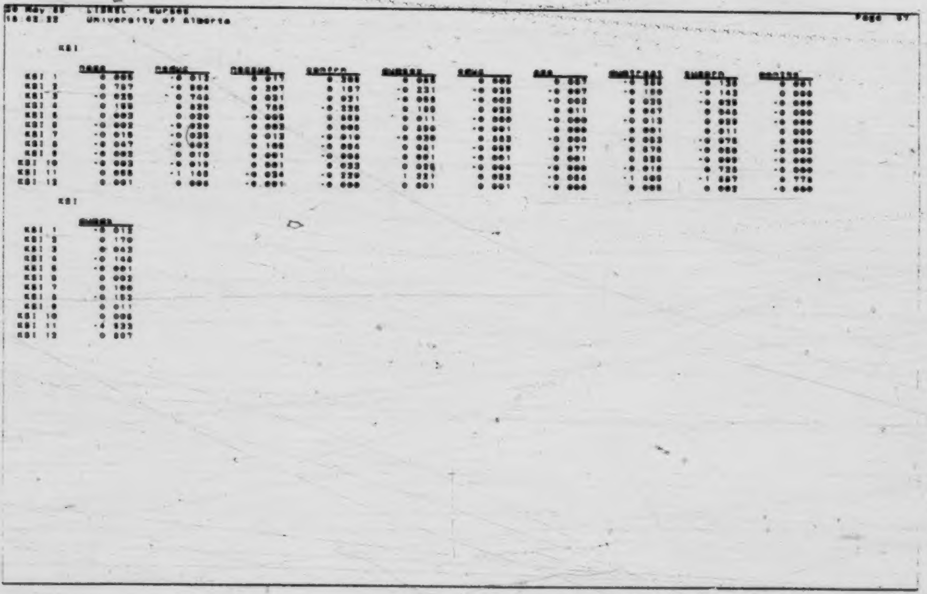
THETA DELTA



LISREL - Nurses
University of Alberta

Nurses' Perceptions of QOL

FACTOR SCORES REGRESSIONS



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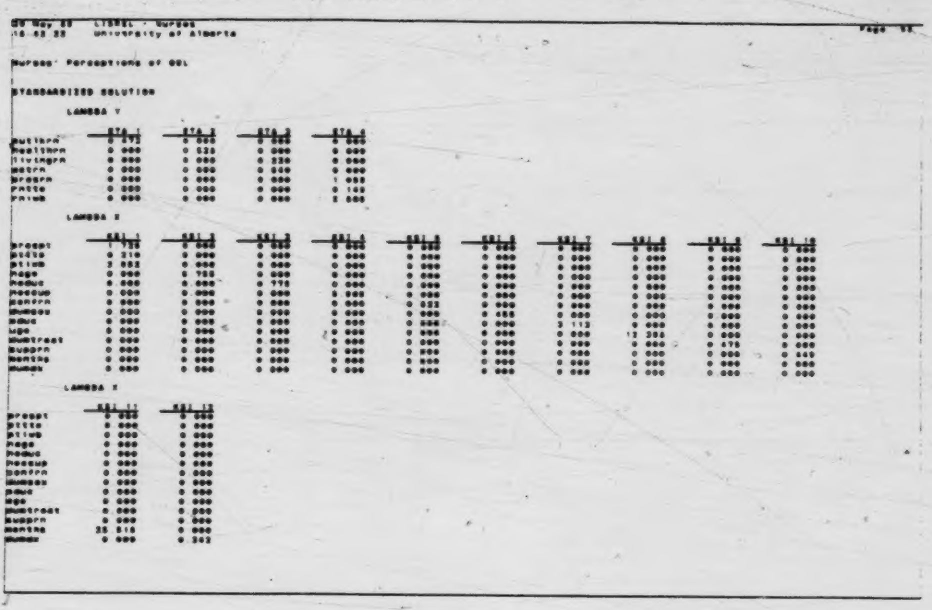

LISREL - Nurses
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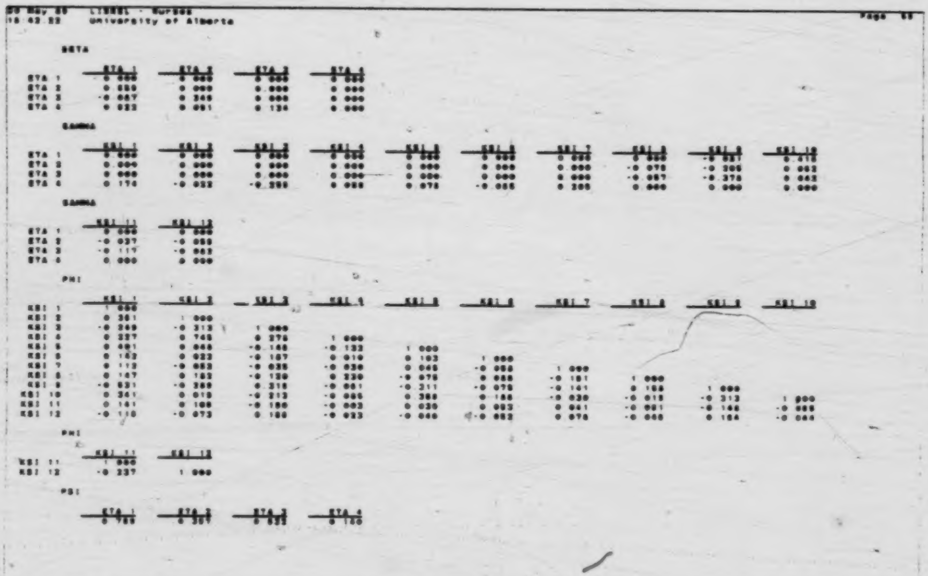
Nurses' Perceptions of QOL

STANDARDIZED SOLUTION

LAMBDA Y

LAMBDA X

LAMBDA X



LISREL - Nurses
University of Alberta

BETA

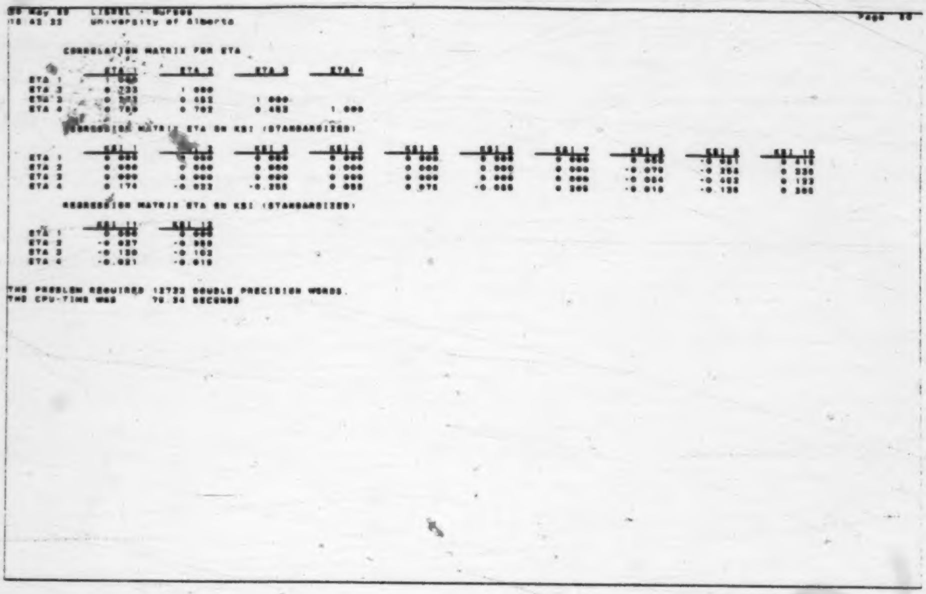
GAMMA

GAMMA

PHI

PHI

PSI



```
[illegible] May [illegible]   LISREL - Nurses                                                Page 60
18 42 22     University of Alberta

      CORRELATION MATRIX FOR ETA

              ETA 1      ETA 2      ETA 3      ETA 4
    ETA 1     1.000
    ETA 2     0.723      1.000
    ETA 3     0.[illegible]      0.452      1.000
    ETA 4     0.7[illegible]      0.702      0.452      1.000

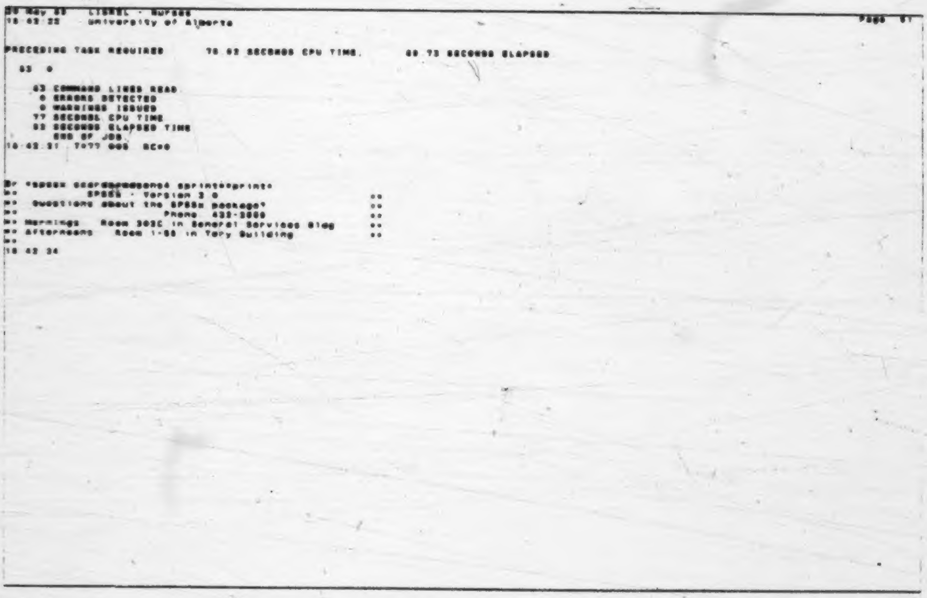
      REGRESSION MATRIX ETA ON KSI (STANDARDIZED)

              KSI 1      KSI 2      KSI 3      KSI 4      KSI 5      KSI 6      KSI 7      KSI 8      KSI 9      KSI 10
    ETA 1     0.000      0.000      0.000      0.000      0.000      0.000      0.000      0.000     -0.081      0.415
    ETA 2     0.000      0.000      0.000      0.000      0.000      0.000      0.000     -0.075     -0.254      0.330
    ETA 3     0.000      0.000      0.000      0.000      0.000      0.000      0.000     -0.054     -0.452      0.122
    ETA 4     0.174     -0.022     -0.255      0.053      0.075     -0.045      0.205     -0.015     -0.135      0.305

      REGRESSION MATRIX ETA ON KSI (STANDARDIZED)

              KSI 11     KSI 12
    ETA 1     0.000      0.000
    ETA 2    -0.027     -0.088
    ETA 3    -0.130     -0.102
    ETA 4    -0.021     -0.019

THE PROBLEM REQUIRED 12723 DOUBLE PRECISION WORDS.
THE CPU-TIME WAS      76.34 SECONDS
```



```
[illegible] May [illegible]   LISREL - Nurses                                                Page 61
18 42 22     University of Alberta

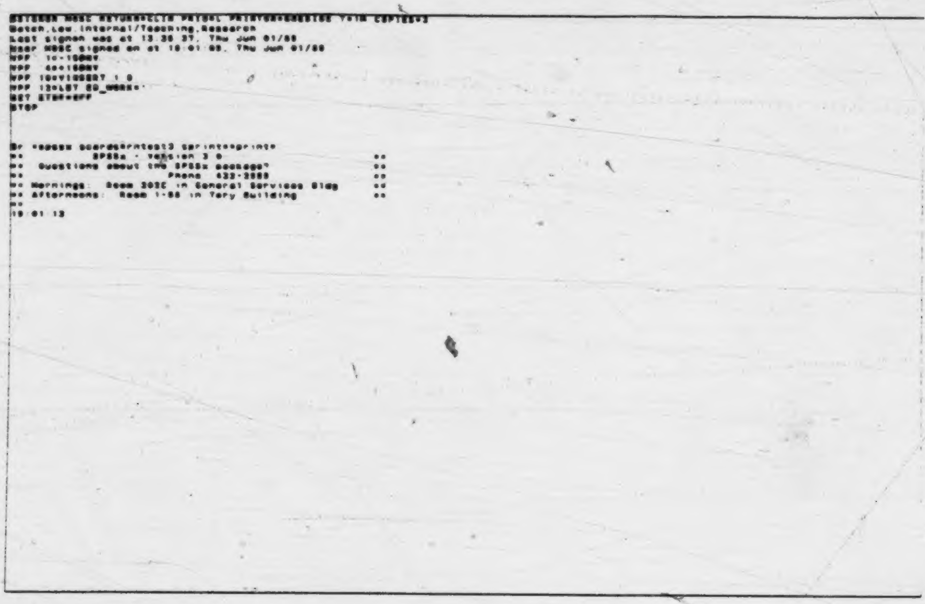
PRECEDING TASK REQUIRED       76.62 SECONDS CPU TIME.       69.73 SECONDS ELAPSED

  63  0

    63 COMMAND LINES READ.
     0 ERRORS DETECTED
     0 WARNINGS ISSUED
    77 SECONDS CPU TIME
    93 SECONDS ELAPSED TIME
       END OF JOB.
18:42:31  T=77 005  RC=0


** *SPSSX [illegible] sprint=print=
**            SPSSX - Version 2.0                                       **
**  Questions about the SPSSx package?                                  **
**                        Phone  432-3000                               **
** Mornings    Room 302C in General Services Bldg                       **
** Afternoons    Room 1-55 in Tory Building                             **
**
18 42 34
```

Appendix 10: LISREL Model of Nurses' Perceptions of QOL of Patients with ESRD (Reduced)



```
[illegible]
Batch,Low,Internal/Teaching,Research
Last signon was at 13:38:37, Thu Jun 01/89
User N0SC signed on at 10:01:09, Thu Jun 01/89
MPF [illegible]
MPF [illegible]
MPF [illegible]
MPF [illegible]
SET [illegible]
STOP


** [illegible]
**             SPSSx - Version 3.0                       **
**  Questions about the SPSSx package?                   **
**                    Phone  432-3983                    **
** Mornings:  Room 303C in General Services Bldg         **
** Afternoons:  Room 1-88 in Tory Building               **
**
10:01:13
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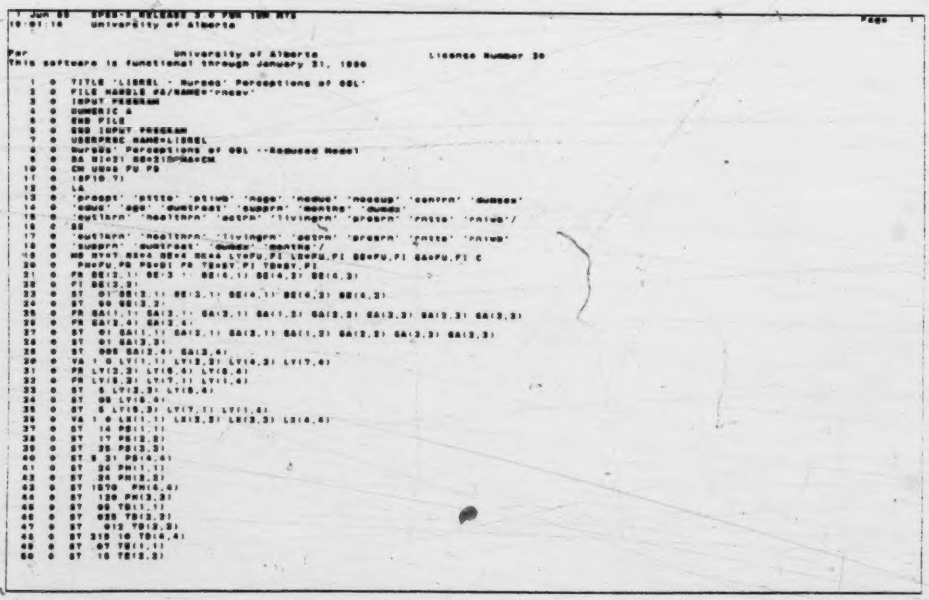

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 1 Jun 89   SPSS-X RELEASE 3.0 FOR IBM MTS                                    Page  1
10:01:16    University of Alberta

For                    University of Alberta                  License Number 30
This software is functional through January 31, 1990

   1  0  TITLE 'LISREL - Nurses' Perceptions of QOL'
   2  0  FILE HANDLE PA/NAME='Pnesv'
   3  0  INPUT PROGRAM
   4  0  NUMERIC A
   5  0  END FILE
   6  0  END INPUT PROGRAM
   7  0  USERPROC NAME=LISREL
   8  0  Nurses' Perceptions of QOL --Reduced Model
   9  0  DA NI=21 NO=219 MA=CM
  10  0  CM UN=8 FU FO
  11  0  (8F10.7)
  12  0  LA
  13  0  'presat' 'pttto' 'ptiwb' 'nage' 'nedue' 'noccup' 'contrn' 'dumsex'
  14  0  'edue' 'age' 'dumtreat' 'supprn' 'months' 'dumdx'
  15  0  'outlkrn' 'healthrn' 'actrn' 'livingrn' 'presrn' 'rnttto' 'rniwb'/
  16  0  SE
  17  0  'outlkrn' 'healthrn' 'livingrn' 'actrn' 'presrn' 'rnttto' 'rniwb'
  18  0  'supprn' 'dumtreat' 'dumdx' 'months'/
  19  0  MO NY=7 NE=4 NX=4 NK=4 LY=FU,FI LX=FU,FI BE=FU,FI GA=FU,FI C
  20  0   PH=FU,FR PS=DI,FR TE=SY,FI TD=SY,FI
  21  0  FR BE(2,1) BE(3,1) BE(4,1) BE(4,2) BE(4,3)
  22  0  FI BE(3,2)
  23  0  ST  .01 BE(2,1) BE(3,1) BE(4,1) BE(4,2) BE(4,3)
  24  0  ST  .00 BE(3,2)
  25  0  FR GA(1,1) GA(2,1) GA(3,1) GA(1,2) GA(2,2) GA(3,2) GA(2,3) GA(3,3)
  26  0  FR GA(2,4) GA(3,4)
  27  0  ST  .01 GA(1,1) GA(2,1) GA(3,1) GA(1,2) GA(2,2) GA(3,2) GA(2,3)
  28  0  ST  .01 GA(3,3)
  29  0  ST  .005 GA(2,4) GA(3,4)
  30  0  VA 1.0 LY(1,1) LY(2,2) LY(4,3) LY(7,4)
  31  0  FR LY(3,2) LY(5,4) LY(6,4)
  32  0  FR LY(5,3) LY(7,1) LY(1,4)
  33  0  ST  .5 LY(3,2) LY(5,4)
  34  0  ST  .06 LY(6,4)
  35  0  ST  .5 LY(5,3) LY(7,1) LY(1,4)
  36  0  VA 1.0 LX(1,1) LX(2,2) LX(3,3) LX(4,4)
  37  0  ST  .14 PS(1,1)
  38  0  ST  .17 PS(2,2)
  39  0  ST  .25 PS(3,3)
  40  0  ST 8.31 PS(4,4)
  41  0  ST  .26 PH(1,1)
  42  0  ST  .24 PH(2,2)
  43  0  ST 1570  PH(4,4)
  44  0  ST  .120 PH(3,3)
  45  0  ST  .06 TD(1,1)
  46  0  ST  .025 TD(2,2)
  47  0  ST   .012 TD(3,3)
  48  0  ST 318.10 TD(4,4)
  49  0  ST  .07 TE(1,1)
  50  0  ST  .10 TE(2,2)
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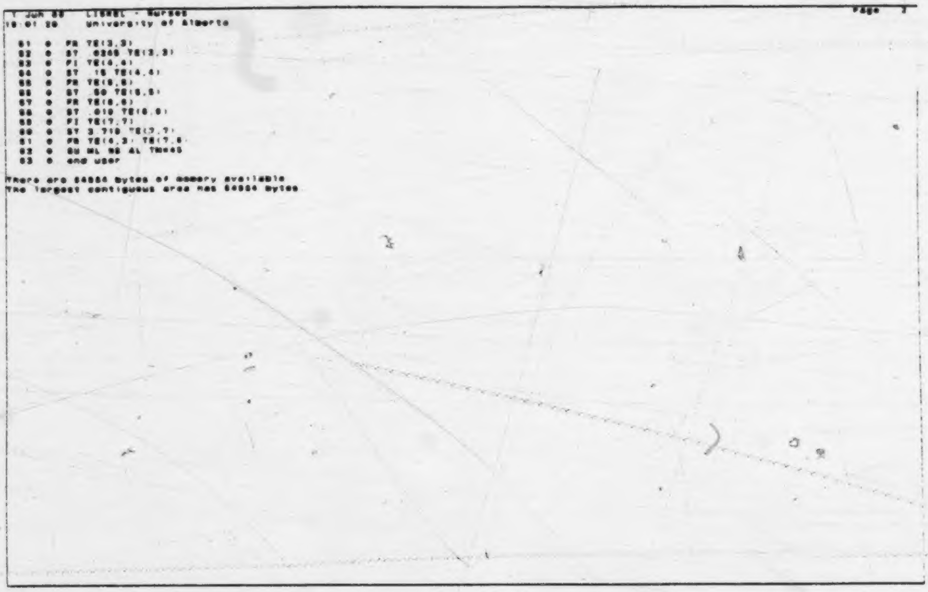
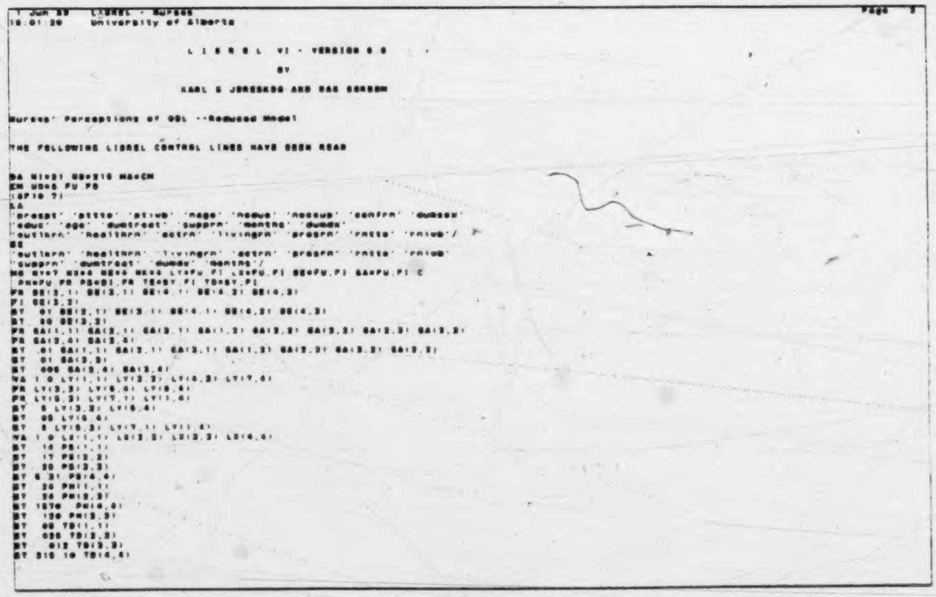


```
7 Jun 89   LISREL - Nurses                                          Page  [illegible]
10:01:20   University of Alberta

  81  0  FR TE(3,3)
  82  0  ST .0265 TE(3,3)
  83  0  FI TE(4,4)
  84  0  ST .15 TE(4,4)
  85  0  FR TE(5,5)
  86  0  ST .50 TE(5,5)
  87  0  FR TE(6,6)
  88  0  ST .010 TE(6,6)
  89  0  FI TE(7,7)
  90  0  ST 3.710 TE(7,7)
  91  0  FR TE(6,3) TE(7,5)
  92  0  OU ML SE AL TM=45
  93  0  end user
There are 64864 bytes of memory available
The largest contiguous area has 64864 bytes
```



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7 Jun 89   LISREL - Nurses                                          Page  [illegible]
10:01:20   University of Alberta

                         L I S R E L  VI - VERSION 6.6

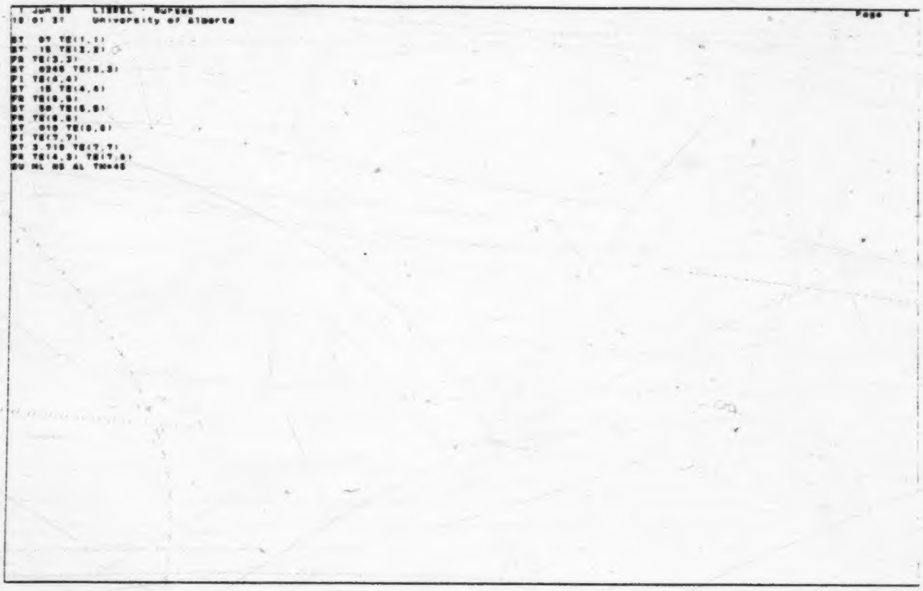
                                      BY

                         KARL G JORESKOG AND DAG SORBOM

Nurses' Perceptions of QOL --Reduced Model

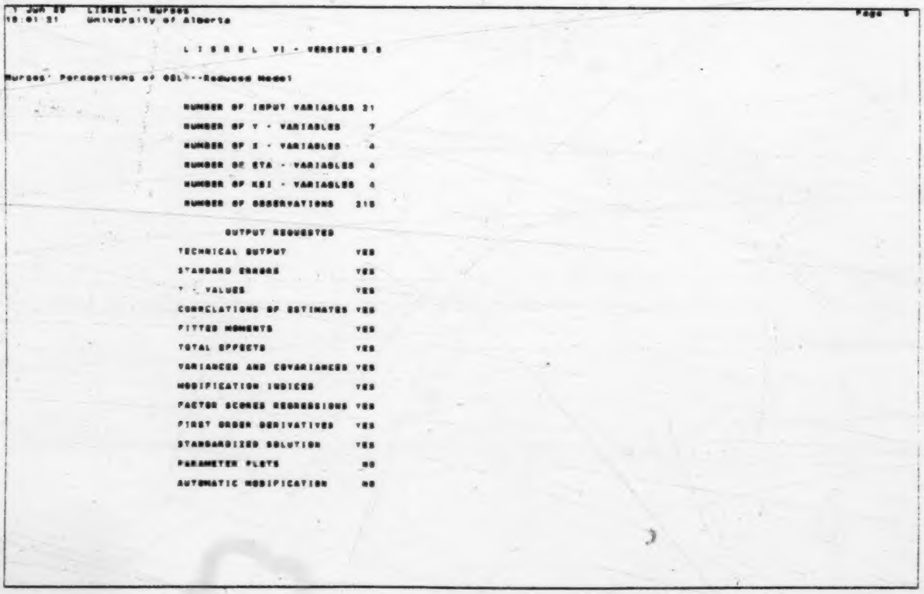
THE FOLLOWING LISREL CONTROL LINES HAVE BEEN READ

DA NI=21 NO=215 MA=CM
CM UN=8 FU FO
(8F10.7)
LA
'presat' 'attto' 'atiwb' 'nage' 'nedue' 'neoccup' 'confrn' 'dumsex'
'educ' 'age' 'dumtreat' 'supprn' 'months' 'dumdx'
'outlkrn' 'healthrn' 'actrn' 'livingrn' 'presrn' 'rattb' 'rniwb'/
SE
'outlkrn' 'healthrn' 'livingrn' 'actrn' 'presrn' 'rattb' 'rniwb'
'supprn' 'dumtreat' 'dumdx' 'months'/
MO NY=7 NE=4 NX=4 NK=4 LY=FU,FI LX=FU,FI BE=FU,FI GA=FU,FI C
 PH=FU,FR PS=DI,FR TE=SY,FI TD=SY,FI
FR BE(2,1) BE(3,1) BE(4,1) BE(4,2) BE(4,3)
FI BE(3,2)
ST  .01 BE(2,1) BE(3,1) BE(4,1) BE(4,2) BE(4,3)
ST  .10 BE(3,2)
FR GA(1,1) GA(2,1) GA(3,1) GA(1,2) GA(2,2) GA(3,2) GA(2,3) GA(3,3)
FR GA(2,4) GA(3,4)
ST .01 GA(1,1) GA(2,1) GA(3,1) GA(1,2) GA(2,2) GA(3,2) GA(2,3)
ST  .01 GA(3,3)
ST  .005 GA(2,4) GA(3,4)
VA 1.0 LY(1,1) LY(2,2) LY(4,3) LY(7,4)
FR LY(3,2) LY(5,4) LY(6,4)
FR LY(5,3) LY(7,1) LY(1,4)
ST  .5 LY(3,2) LY(5,4)
ST  .05 LY(6,4)
ST  .5 LY(5,3) LY(7,1) LY(1,4)
VA 1.0 LX(1,1) LX(2,2) LX(3,3) LX(4,4)
ST  .16 PS(1,1)
ST  .17 PS(2,2)
ST  .20 PS(3,3)
ST 6.31 PS(4,4)
ST  .26 PH(1,1)
ST  .24 PH(2,2)
ST .1570  PH(4,4)
ST  .120 PH(3,3)
ST  .06 TD(1,1)
ST  .035 TD(2,2)
ST   .012 TD(3,3)
ST 215.10 TD(4,4)
```



```
 7 JUN 89    LISREL - Nurses                                          Page 4
10:01:31     University of Alberta

ST  .07 TE(1,1)
ST  .15 TE(2,2)
FR TE(3,3)
ST  .0246 TE(3,3)
FI TE(4,4)
ST  .15 TE(4,4)
FR TE(5,5)
ST  .50 TE(5,5)
FR TE(6,6)
ST  .010 TE(6,6)
FI TE(7,7)
ST 3.710 TE(7,7)
FR TE(4,3) TE(7,6)
OU ML NS AL TM=45
```



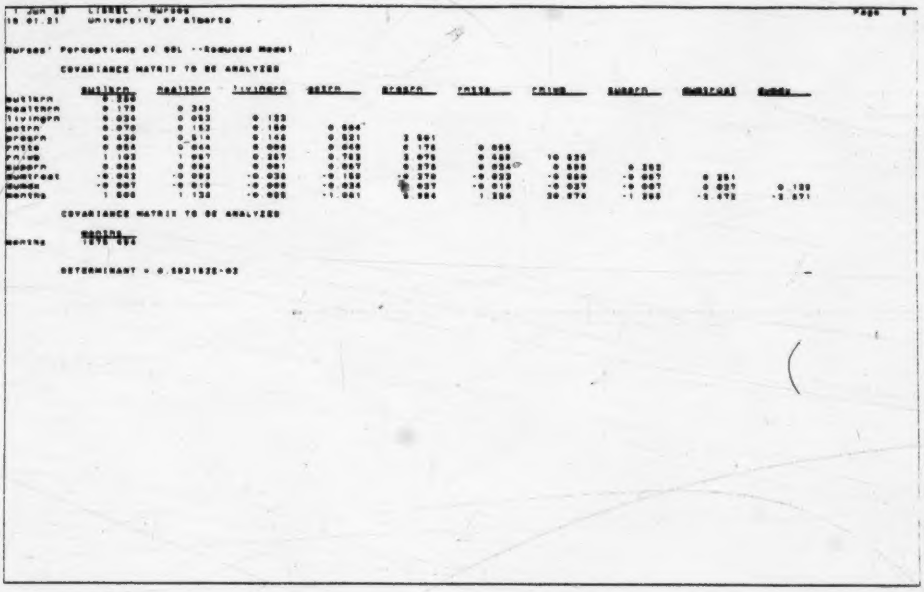
```
 7 JUN 89    LISREL - Nurses                                          Page 5
10:01:31     University of Alberta

                         L I S R E L  VI - VERSION 6.6

Nurses' Perceptions of QOL---Reduced Model

                         NUMBER OF INPUT VARIABLES 21
                         NUMBER OF Y - VARIABLES    7
                         NUMBER OF X - VARIABLES    4
                         NUMBER OF ETA - VARIABLES  4
                         NUMBER OF KSI - VARIABLES  4
                         NUMBER OF OBSERVATIONS   215

                              OUTPUT REQUESTED
                        TECHNICAL OUTPUT           YES
                        STANDARD ERRORS            YES
                        T - VALUES                 YES
                        CORRELATIONS OF ESTIMATES  YES
                        FITTED MOMENTS             YES
                        TOTAL EFFECTS              YES
                        VARIANCES AND COVARIANCES  YES
                        MODIFICATION INDICES       YES
                        FACTOR SCORES REGRESSIONS  YES
                        FIRST ORDER DERIVATIVES    YES
                        STANDARDIZED SOLUTION      YES
                        PARAMETER PLOTS             NO
                        AUTOMATIC MODIFICATION      NO
```



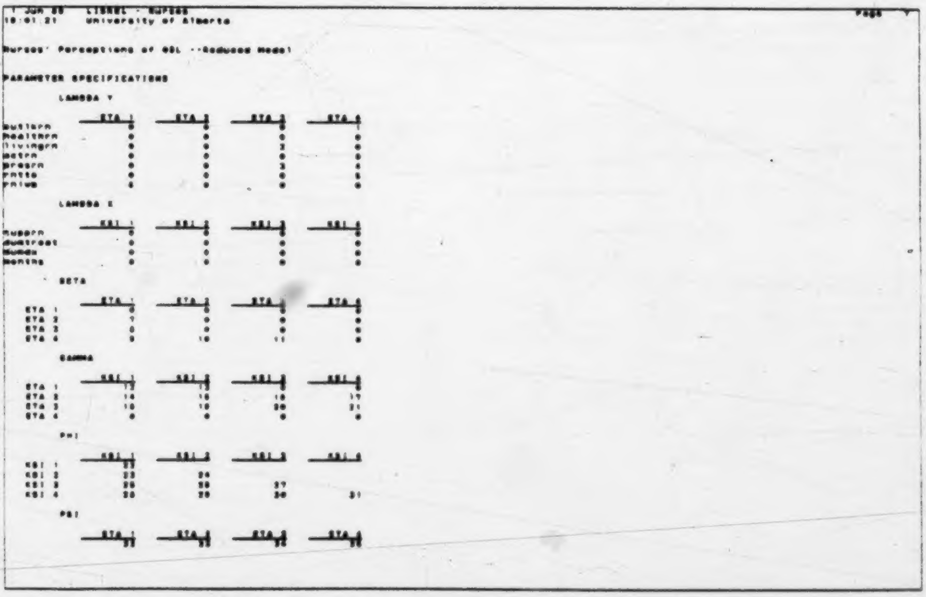
```
LISREL - Nurses
University of Alberta

Nurses' Perceptions of QOL --Reduced Model

        COVARIANCE MATRIX TO BE ANALYZED

        COVARIANCE MATRIX TO BE ANALYZED

        DETERMINANT =
```



```
LISREL - Nurses
University of Alberta

Nurses' Perceptions of QOL --Reduced Model

PARAMETER SPECIFICATIONS

        LAMBDA Y

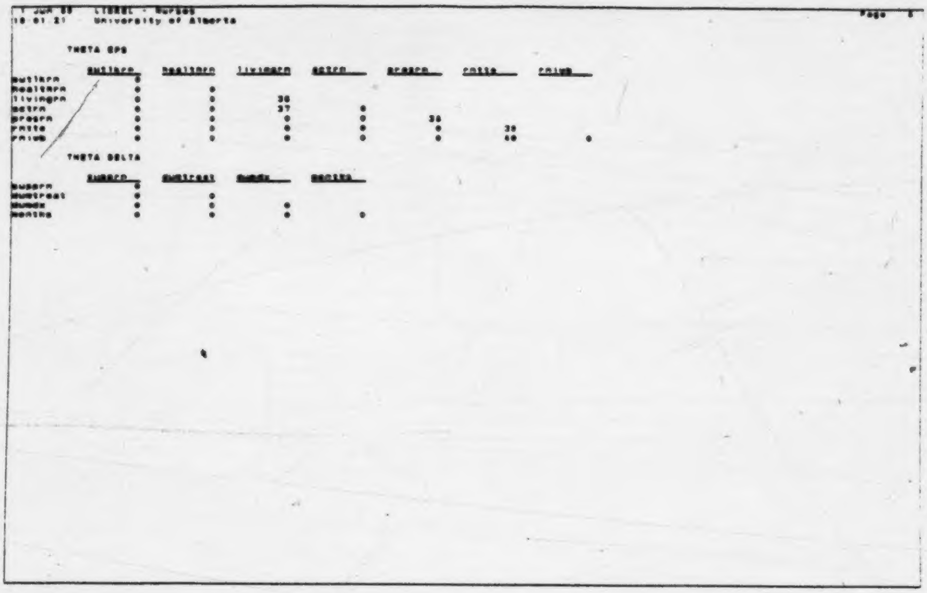
        LAMBDA X

        BETA

        GAMMA

        PHI

        PSI
```



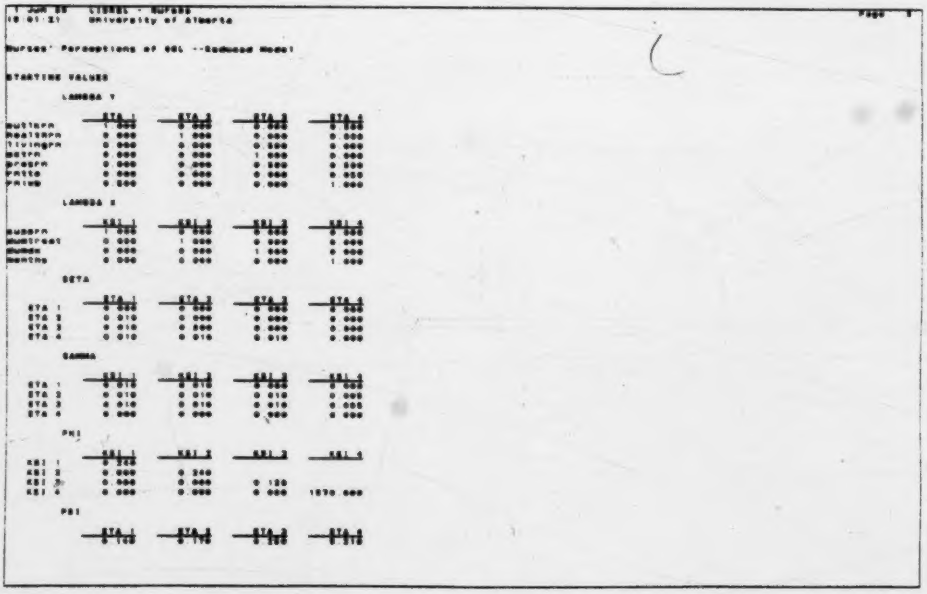
```
1 JUN 88   LISREL - Nurses                                                  Page [illegible]
18:01:21   University of Alberta

        THETA EPS

           nutlkrn   healtkrn  livingrn  actrn     presrn    fnite     fnivb
nutlkrn       0
healtkrn      0         0
livingrn      0         0        36
actrn         0         0        37         0
presrn        0         0         0         0        38
fnite         0         0         0         0         0        39
fnivb         0         0         0         0         0        40         0

        THETA DELTA

           suporn    sumtreat  sumdx     months
suporn        0
sumtreat      0         0
sumdx         0         0         0
months        0         0         0         0
```



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1 JUN 88   LISREL - Nurses                                                  Page [illegible]
18:01:21   University of Alberta

Nurses' Perceptions of QOL --Reduced Model

STARTING VALUES

        LAMBDA Y

             ETA 1      ETA 2      ETA 3      ETA 4
nutlkrn      1.000      0.000      0.000      0.000
healtkrn     0.000      1.000      0.000      0.000
livingrn     0.000      0.000      0.000      0.000
actrn        0.000      0.000      1.000      0.000
presrn       0.000      0.000      0.000      0.000
fnite        0.000      0.000      0.000      0.000
fnivb        0.000      0.000      0.000      1.000

        LAMBDA X

             KSI 1      KSI 2      KSI 3      KSI 4
suporn       1.000      0.000      0.000      0.000
sumtreat     0.000      1.000      0.000      0.000
sumdx        0.000      0.000      1.000      0.000
months       0.000      0.000      0.000      1.000

        BETA

             ETA 1      ETA 2      ETA 3      ETA 4
   ETA 1     0.000      0.000      0.000      0.000
   ETA 2     0.010      0.000      0.000      0.000
   ETA 3     0.010      0.000      0.000      0.000
   ETA 4     0.010      0.010      0.010      0.000

        GAMMA

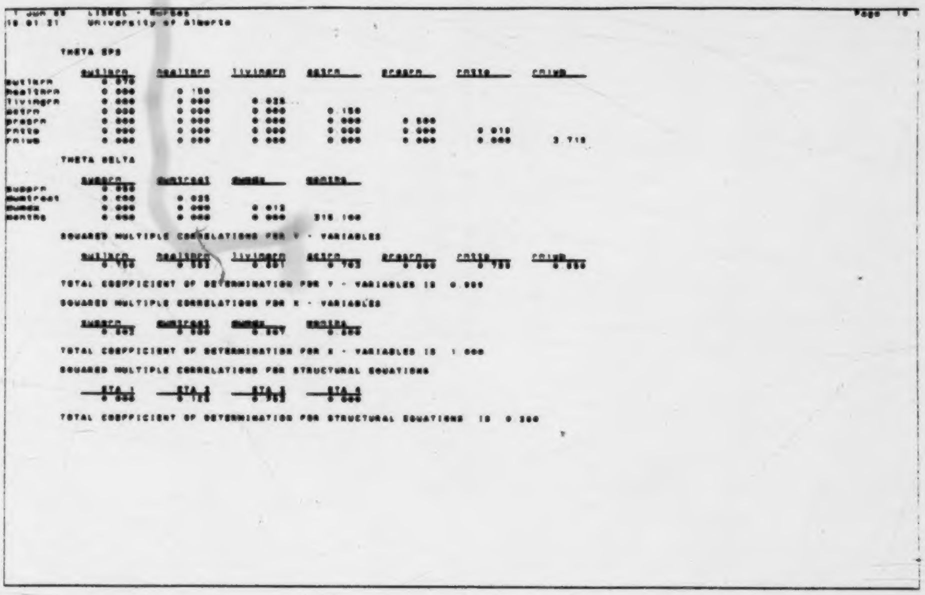
             KSI 1      KSI 2      KSI 3      KSI 4
   ETA 1     0.010      0.010      0.000      0.000
   ETA 2     0.010      0.010      0.010      0.000
   ETA 3     0.010      0.010      0.010      0.000
   ETA 4     0.000      0.000      0.000      0.000

        PHI

             KSI 1      KSI 2      KSI 3      KSI 4
   KSI 1     0.260
   KSI 2     0.000      0.240
   KSI 3     0.000      0.000      0.120
   KSI 4     0.000      0.000      0.000   1570.000

        PSI

             ETA 1      ETA 2      ETA 3      ETA 4
          [illegible]   0.176   [illegible]   0.316
```



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7 JUN 89    LISREL - Nurses                                                    Page 10
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        THETA EPS

              swlifpr    healthpr   livingpr   estpr      progpr     fnsts      fnlwb
swlifpr        0.070
healthpr       0.000      0.150
livingpr       0.000      0.000      0.025
estpr          0.000      0.000      0.000      0.150
progpr         0.000      0.000      0.000      0.000      0.500
fnsts          0.000      0.000      0.000      0.000      0.000      0.010
fnlwb          0.000      0.000      0.000      0.000      0.000      0.000      3.710

        THETA DELTA

              supprn     pwstrest   pwmgx      months
supprn         0.050
pwstrest       0.000      0.025
pwmgx          0.000      0.000      0.012
months         0.000      0.000      0.000    315.100

        SQUARED MULTIPLE CORRELATIONS FOR Y - VARIABLES

              swlifpr    healthpr   livingpr   estpr      progpr     fnsts      fnlwb
               0.750      0.883      0.881      0.763      0.800      0.755      0.850

        TOTAL COEFFICIENT OF DETERMINATION FOR Y - VARIABLES IS  0.999

        SQUARED MULTIPLE CORRELATIONS FOR X - VARIABLES

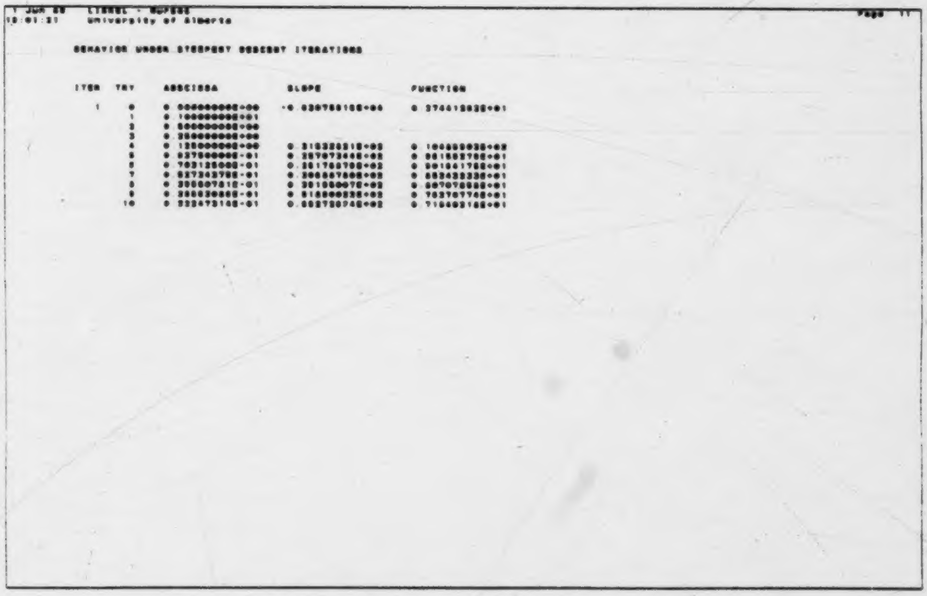
              supprn     pwstrest   pwmgx      months
               0.863      0.800      0.907      0.800

        TOTAL COEFFICIENT OF DETERMINATION FOR X - VARIABLES IS  1.000

        SQUARED MULTIPLE CORRELATIONS FOR STRUCTURAL EQUATIONS

              ETA 1      ETA 2      ETA 3      ETA 4
               0.000      0.123      0.752      0.000

        TOTAL COEFFICIENT OF DETERMINATION FOR STRUCTURAL EQUATIONS  IS  0.300
```



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7 JUN 89    LISREL - Nurses                                                    Page 11
10:01:31    University of Alberta

        BEHAVIOR UNDER STEEPEST DESCENT ITERATIONS

        ITER  TRY     ABSCISSA           SLOPE              FUNCTION

          1     0     0.000000000E+00   -0.830760185E+04    0.374413828E+01
                1     0.100000000E+01
                2     0.500000000E+00
                3     0.250000000E+00
                4     0.125000000E+00    0.315328215E+03    0.100003038E+02
                5     0.625000000E-01    0.257073445E+03    0.861502758E+01
                6     0.703125000E-01    0.281768578E+03    0.801861758E+01
                7     0.527343750E-01    0.206587808E+03    0.883423338E+01
                8     0.395507813E-01    0.281580078E+03    0.807078883E+01
                9     0.296630860E-01    0.518000338E+03    0.762707748E+01
               10     0.222473145E-01    0.882730748E+02    0.716403165E+01
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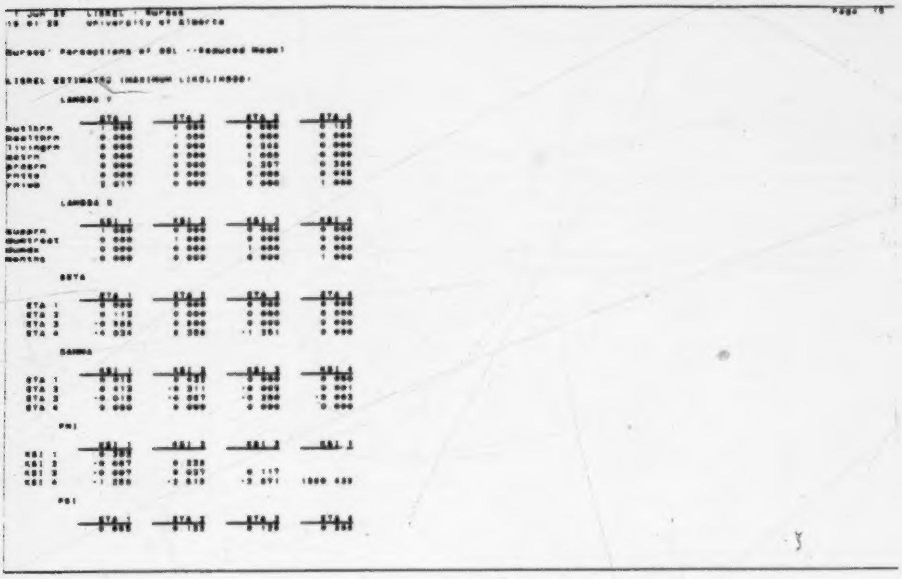


```
University of Alberta

Nurses' Perceptions of QOL --Reduced Model

LISREL ESTIMATES (MAXIMUM LIKELIHOOD)

        LAMBDA Y

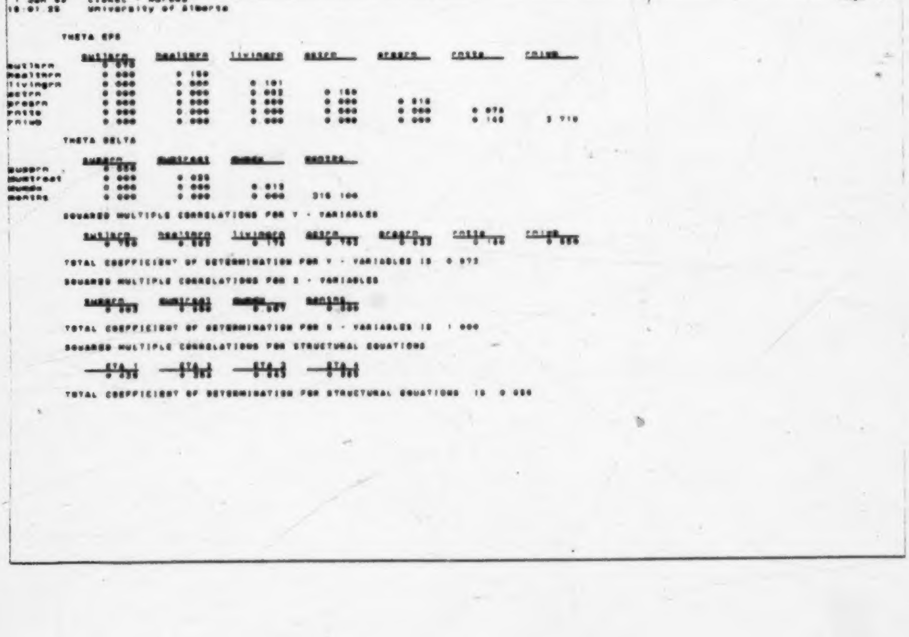
        LAMBDA X

        BETA

        GAMMA

        PHI

        PSI
```



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University of Alberta

        THETA EPS

        THETA DELTA

        SQUARED MULTIPLE CORRELATIONS FOR Y - VARIABLES

        TOTAL COEFFICIENT OF DETERMINATION FOR Y - VARIABLES IS [illegible]

        SQUARED MULTIPLE CORRELATIONS FOR X - VARIABLES

        TOTAL COEFFICIENT OF DETERMINATION FOR X - VARIABLES IS [illegible]

        SQUARED MULTIPLE CORRELATIONS FOR STRUCTURAL EQUATIONS

        TOTAL COEFFICIENT OF DETERMINATION FOR STRUCTURAL EQUATIONS  IS [illegible]
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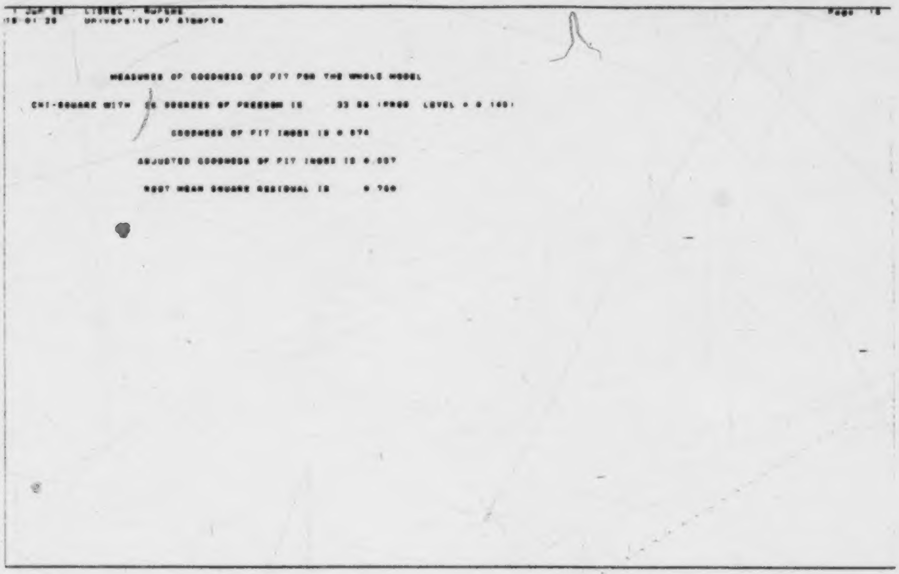

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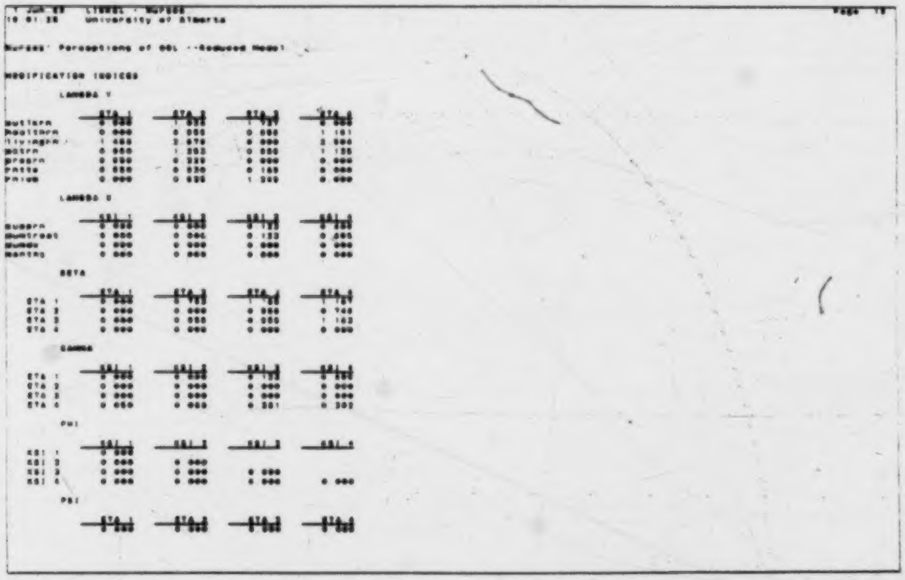
          MEASURES OF GOODNESS OF FIT FOR THE WHOLE MODEL

 CHI-SQUARE WITH [illegible] DEGREES OF FREEDOM IS    33.[illegible] (PROB. LEVEL = 0.1[illegible])

                    GOODNESS OF FIT INDEX IS 0.974

               ADJUSTED GOODNESS OF FIT INDEX IS 0.937

                ROOT MEAN SQUARE RESIDUAL IS     0.700
```



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Nurses' Perceptions of QOL --Reduced Model

MODIFICATION INDICES

        LAMBDA Y

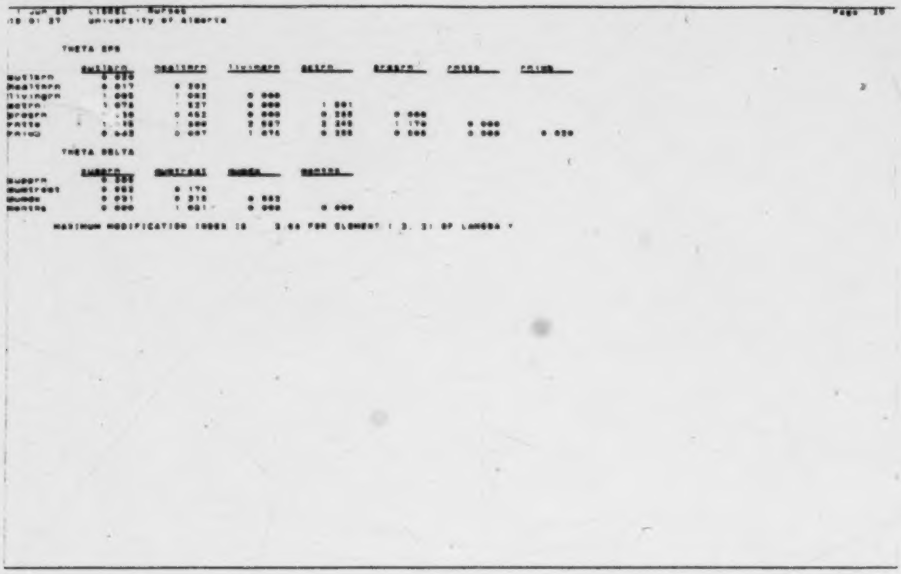
        LAMBDA X

        BETA

        GAMMA

        PHI

        PSI
```



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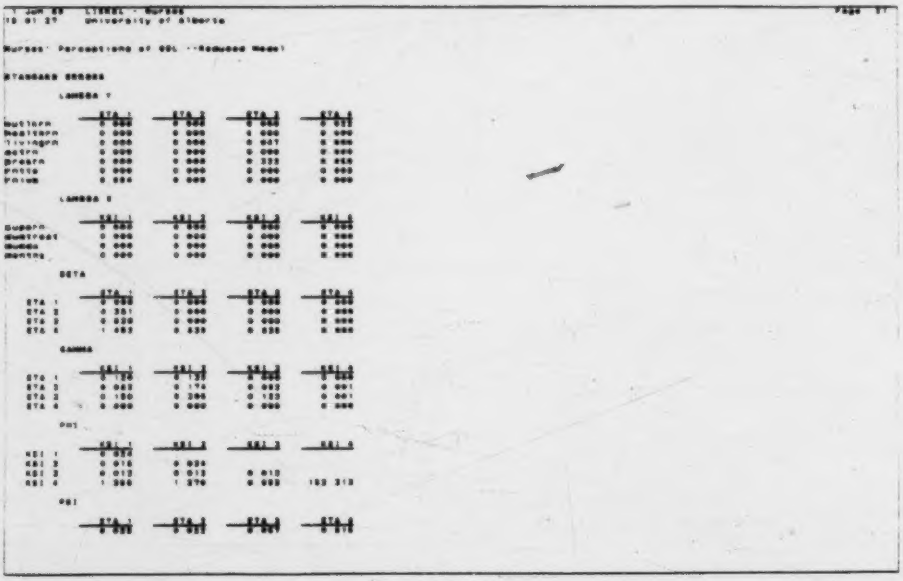
THETA EPS

THETA DELTA

MAXIMUM MODIFICATION INDEX IS FOR ELEMENT OF LAMBDA Y



LISREL - Nurses

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Nurses' Perceptions of QOL --Reduced Model

STANDARD ERRORS

LAMBDA Y

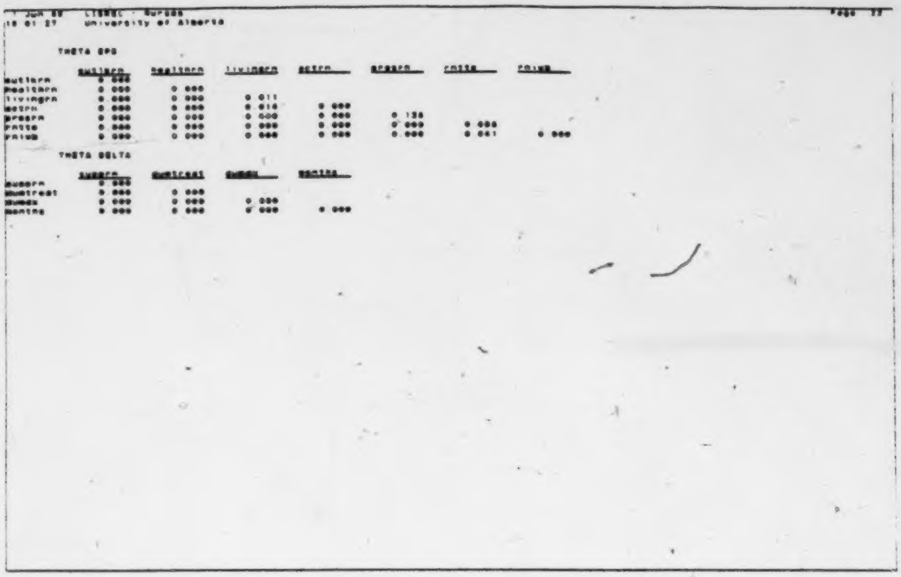
LAMBDA X

BETA

GAMMA

PHI

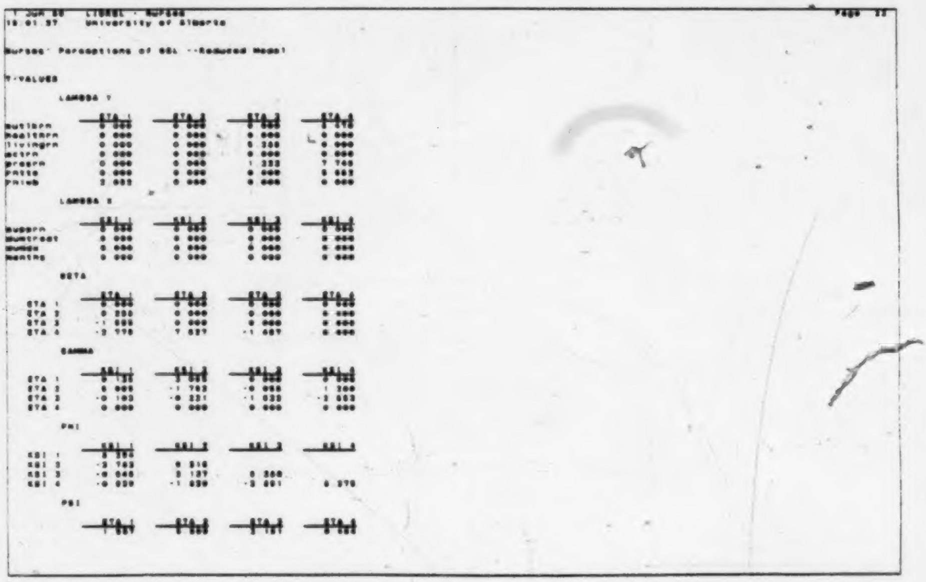
PSI



University of Alberta

THETA EPS

THETA DELTA



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T-VALUES

LAMBDA Y

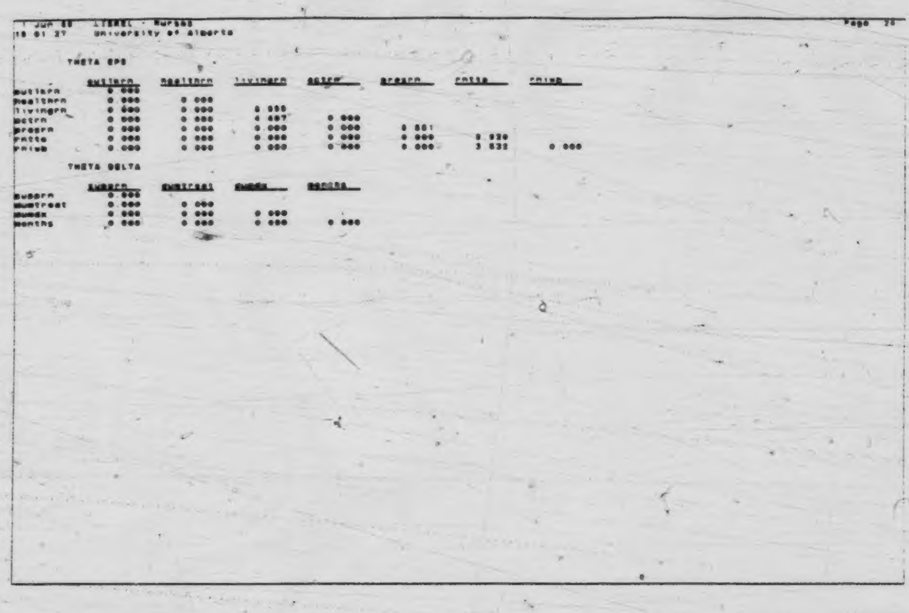
LAMBDA X

BETA

GAMMA

PHI

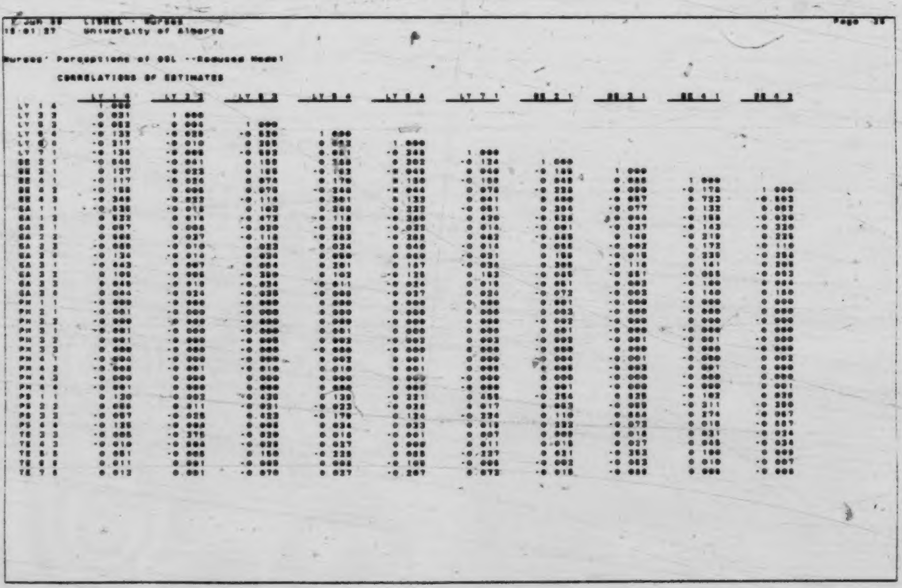
PSI



LISREL - Nurses
University of Alberta

THETA EPS

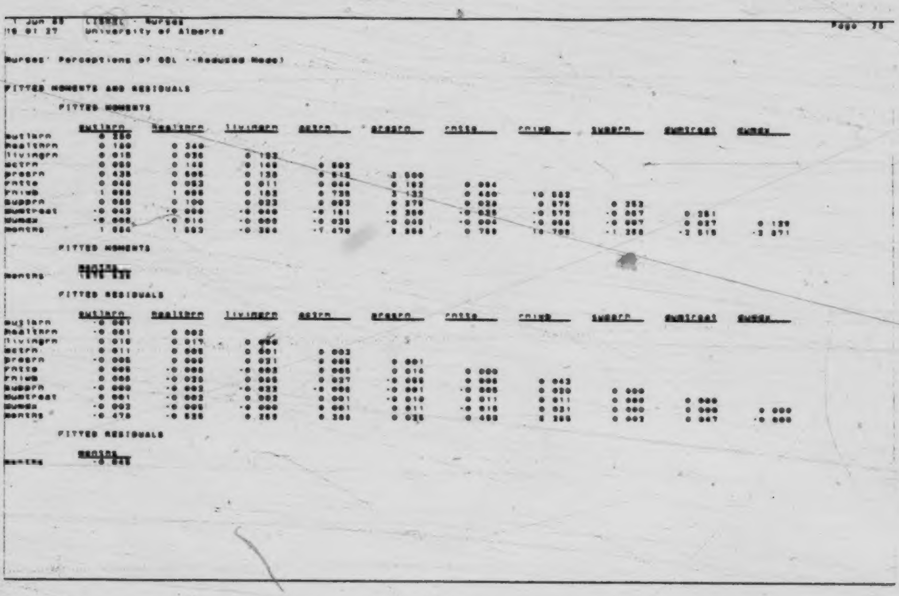
THETA DELTA



LISREL - Nurses
University of Alberta

Nurses' Perceptions of QOL --Reduced Model

CORRELATIONS OF ESTIMATES



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1 Jun 89    LISREL - Nurses
10 01 27    University of Alberta

Nurses' Perceptions of QOL --Reduced Model

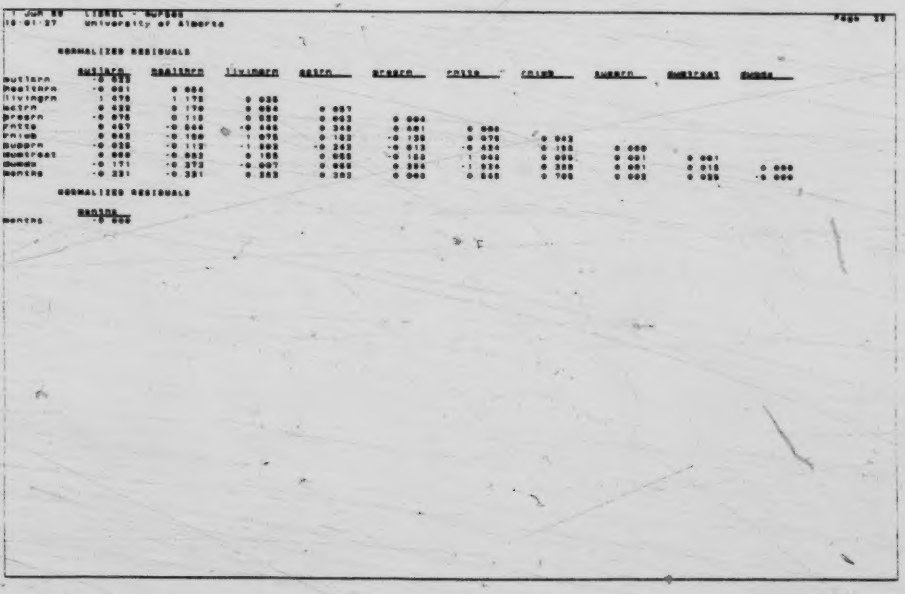
FITTED MOMENTS AND RESIDUALS

        FITTED MOMENTS

        FITTED MOMENTS

        FITTED RESIDUALS

        FITTED RESIDUALS
```



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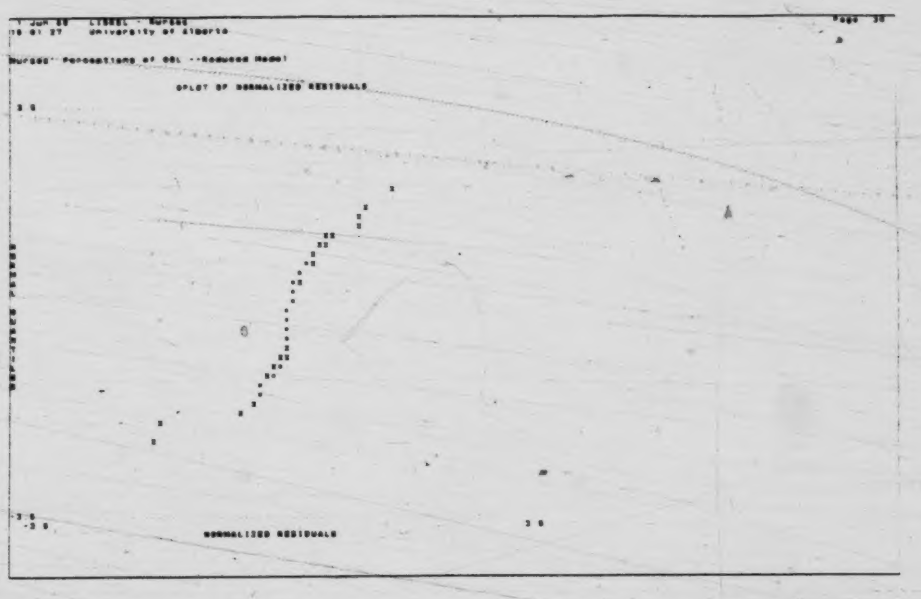
1 Jun 89    LISREL - Nurses
10:01:27    University of Alberta

        NORMALIZED RESIDUALS

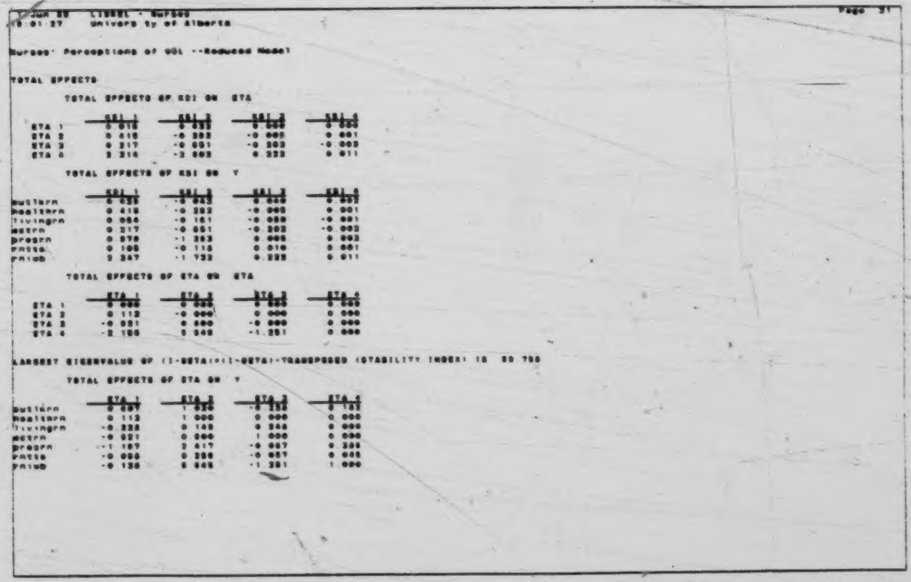
        NORMALIZED RESIDUALS
```



1 JUN 88 LISREL - Nurses
10:01:27 University of Alberta
Page 30

Nurses' Perceptions of QOL --Reduced Model

QPLOT OF NORMALIZED RESIDUALS



1 JUN 88 LISREL - Nurses
10:01:27 University of Alberta
Page 31

Nurses' Perceptions of QOL --Reduced Model

TOTAL EFFECTS

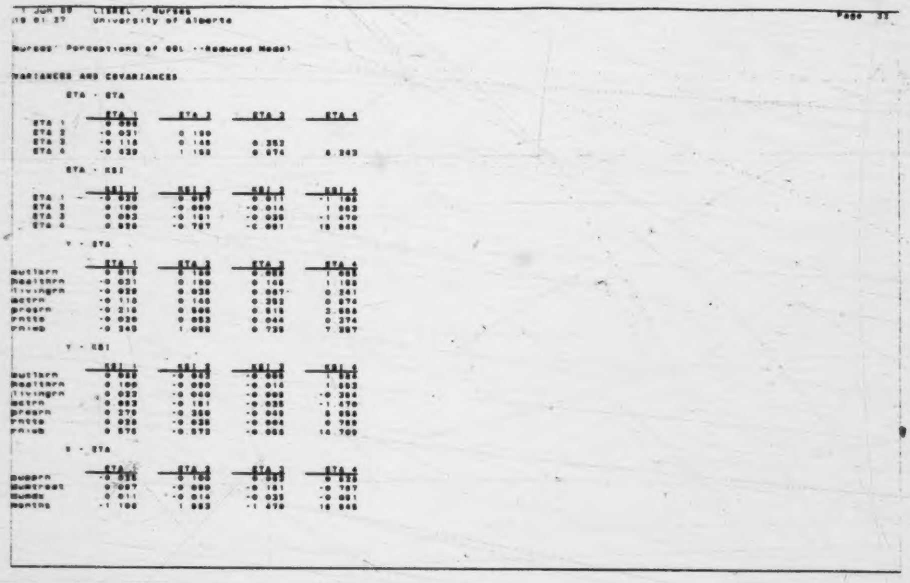
TOTAL EFFECTS OF KSI ON ETA

TOTAL EFFECTS OF KSI ON Y

TOTAL EFFECTS OF ETA ON ETA

LARGEST EIGENVALUE OF (I-BETA)*(I-BETA)-TRANSPOSED (STABILITY INDEX) IS

TOTAL EFFECTS OF ETA ON Y



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 7 JUN 89   LISREL - Nurses                                      Page 33
19 01 27    University of Alberta

Nurses' Perceptions of QOL --Reduced Model

VARIANCES AND COVARIANCES

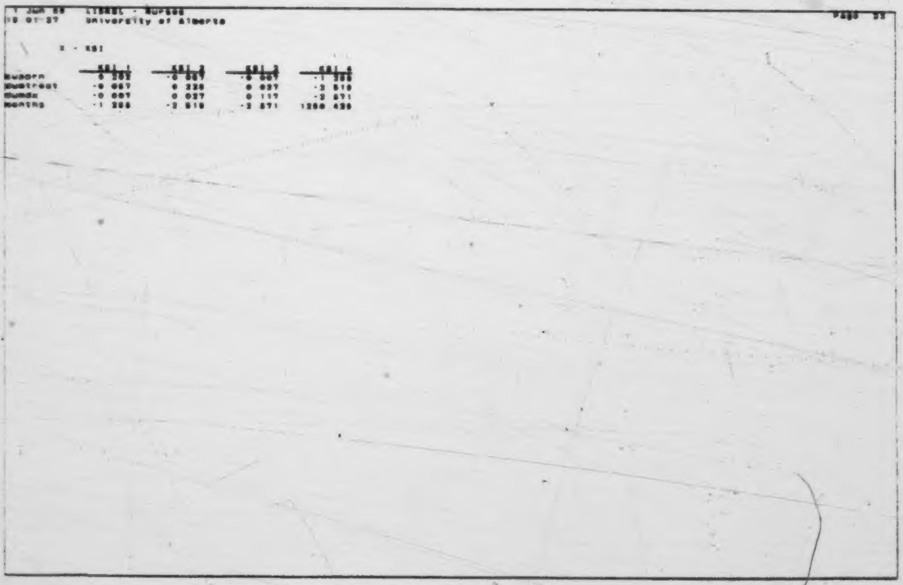
        ETA - ETA

        ETA - KSI

        Y - ETA

        Y - KSI

        X - ETA
```



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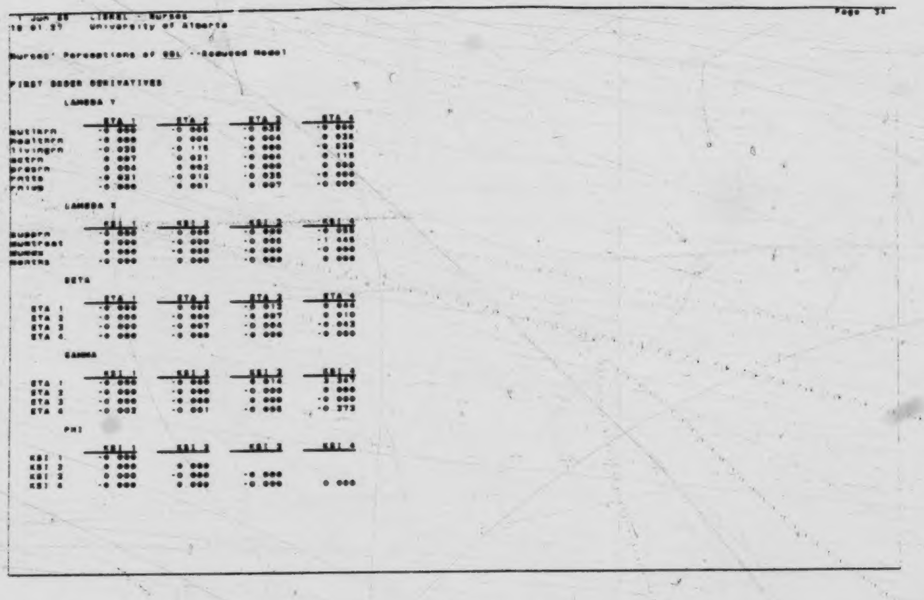
 7 JUN 89   LISREL - Nurses                                      Page 33
19 01 27    University of Alberta

        X - KSI
```



1 Jun 88 LISREL - Nurses
10 01 27 University of Alberta

Nurses' Perceptions of QOL --Reduced Model

FIRST ORDER DERIVATIVES

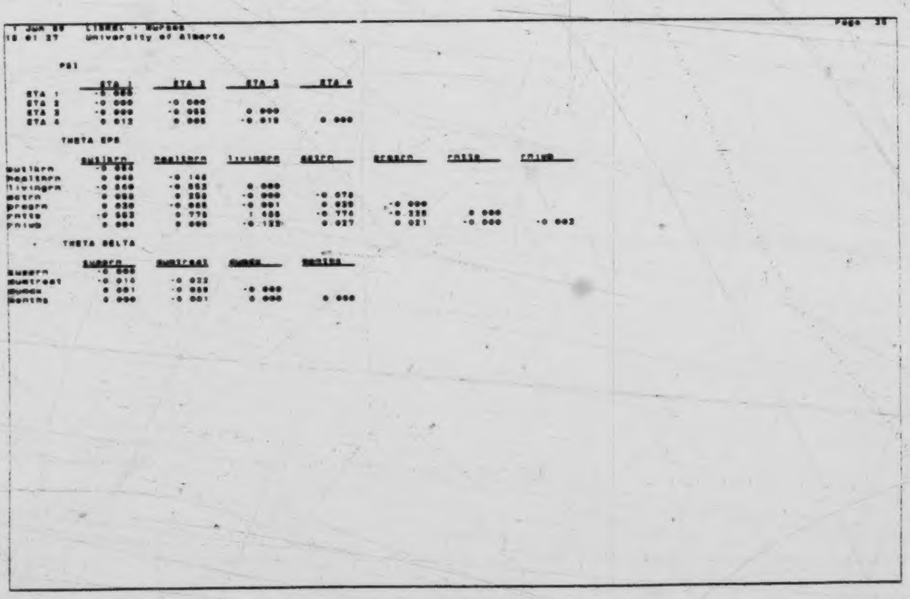
LAMBDA Y

LAMBDA X

BETA

GAMMA

PHI

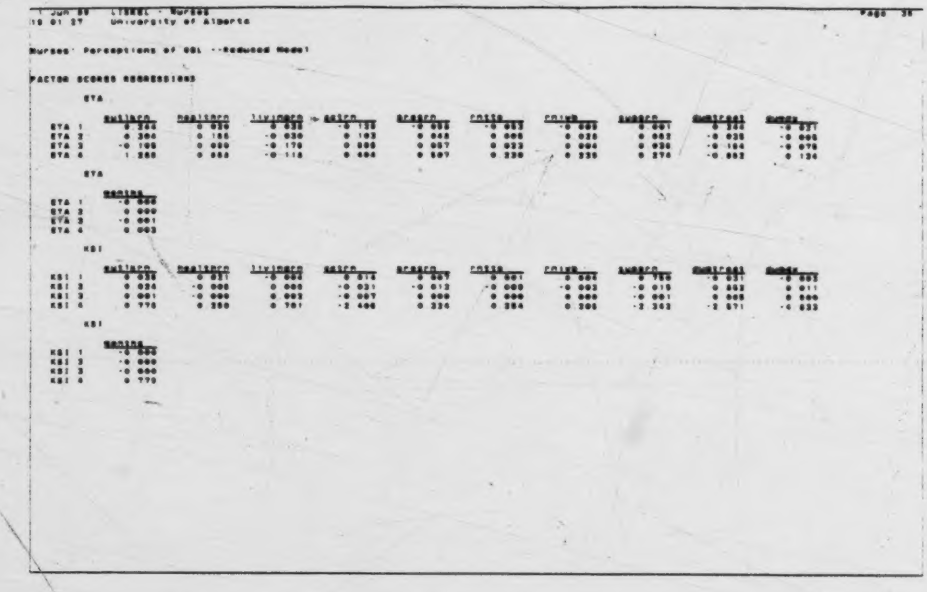


1 Jun 88 LISREL - Nurses
10 01 27 University of Alberta

PSI

THETA EPS

THETA DELTA



```
University of Alberta

Nurses' Perceptions of QOL --Reduced Model

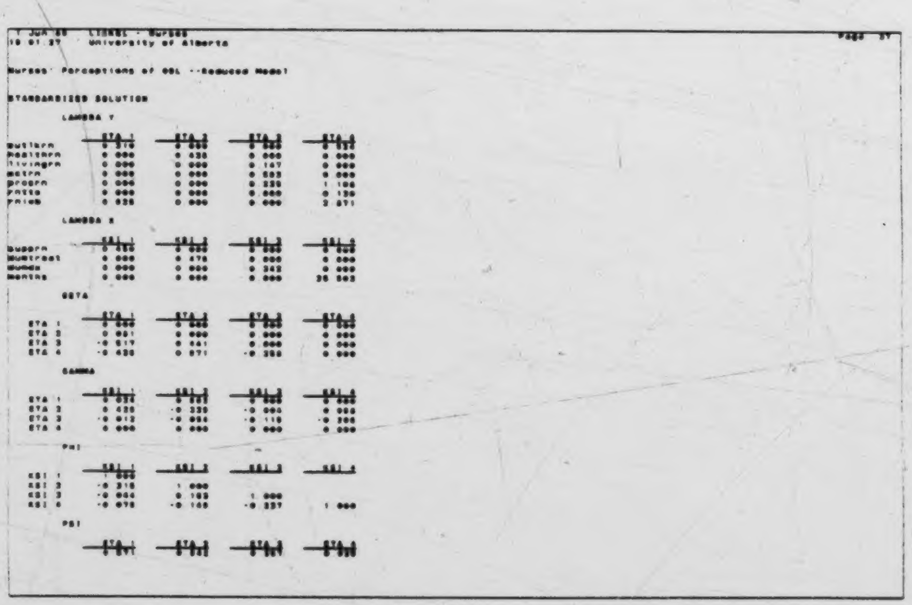
FACTOR SCORES REGRESSIONS

     ETA

     ETA

     KSI

     KSI
```



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University of Alberta

Nurses' Perceptions of QOL --Reduced Model

STANDARDIZED SOLUTION

     LAMBDA Y

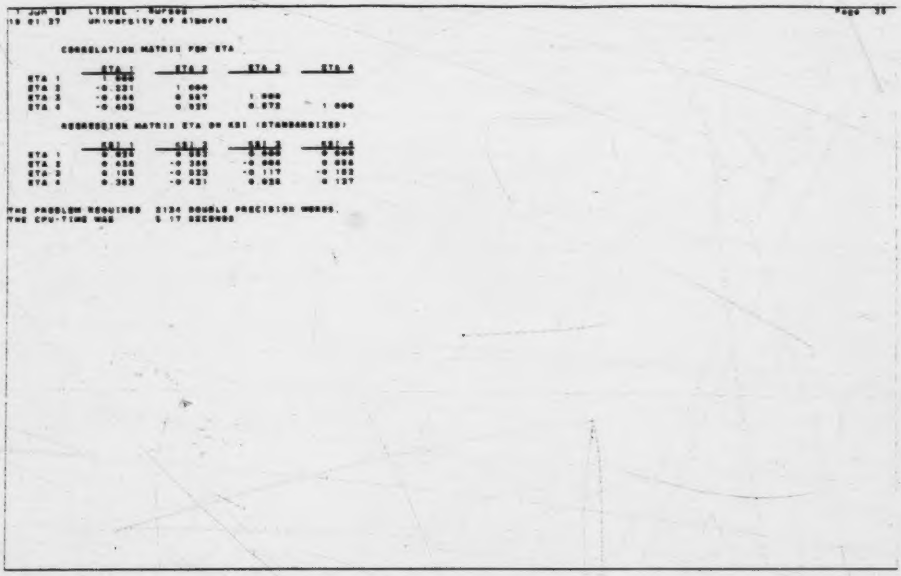
     LAMBDA X

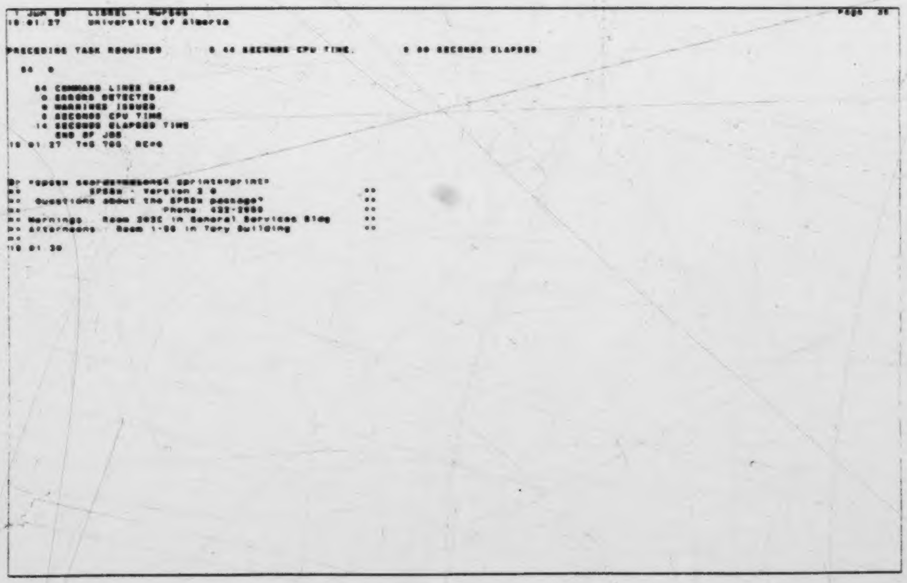
     BETA

     GAMMA

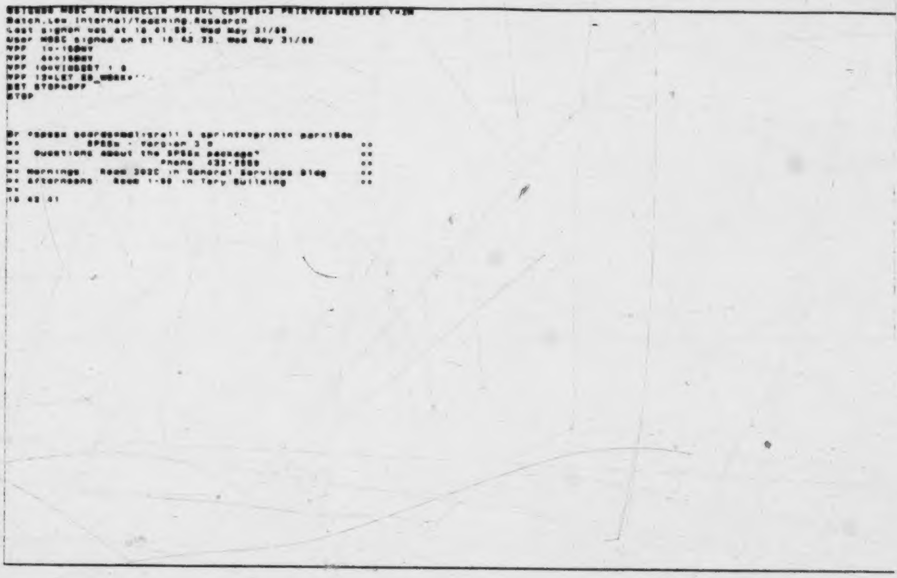
     PHI

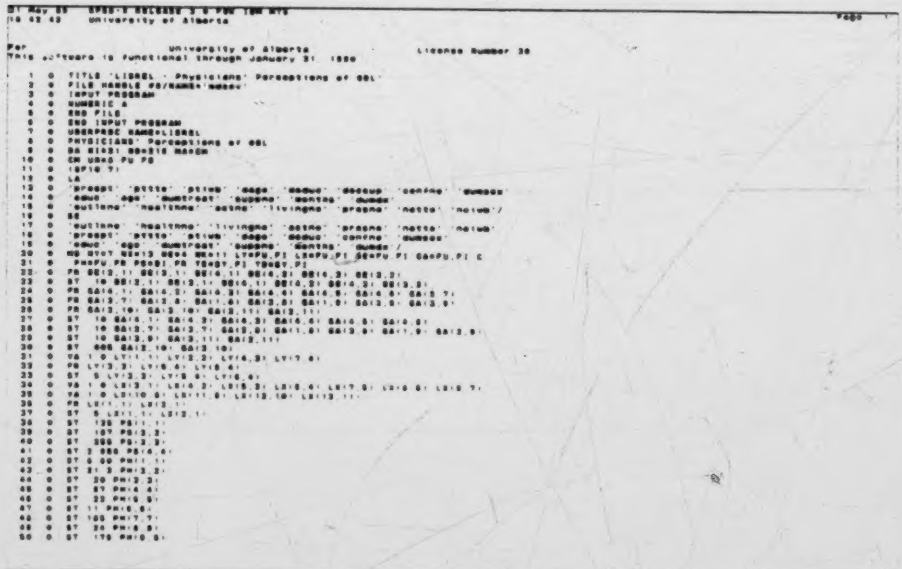
     PSI
```

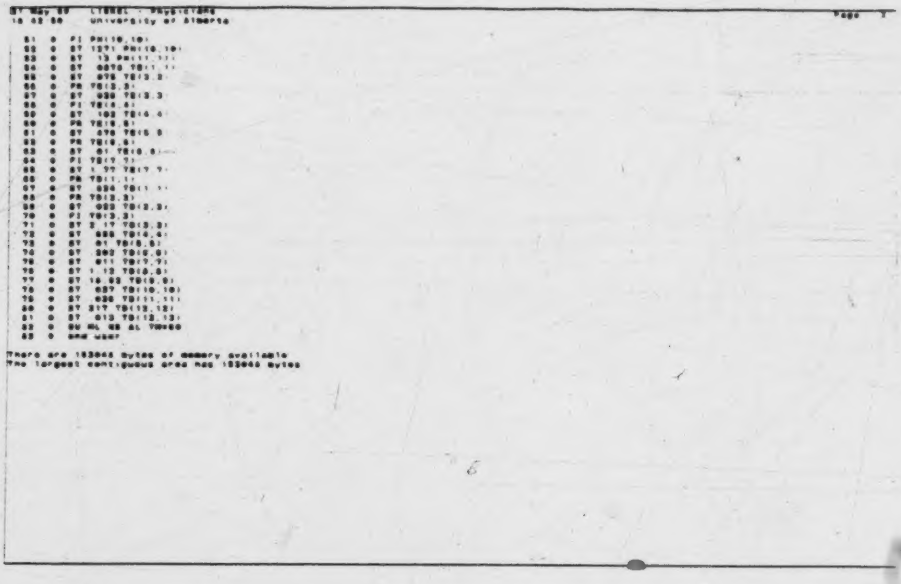




Appendix 11: LISREL Model of Physicians' Perceptions of QOL of Patients with ESRD (Total)







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31 May 89   LISREL - Physicians                                    Page 2
15 42 50    University of Alberta

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  52   0  ST 1271 PH(10,10)
  53   0  ST  .13 PH(11,11)
  54   0  ST  .0076 TE(1,1)
  55   0  ST  .076 TE(2,2)
  56   0  FR TE(3,3)
  57   0  ST  .030 TE(3,3)
  58   0  FI TE(4,4)
  59   0  ST  .102 TE(4,4)
  60   0  FR TE(5,5)
  61   0  ST  .076 TE(5,5)
  62   0  FR TE(6,6)
  63   0  ST  .01 TE(6,6)
  64   0  FI TE(7,7)
  65   0  ST 1.77 TE(7,7)
  66   0  FR TD(1,1)
  67   0  ST  .024 TD(1,1)
  68   0  FR TD(2,2)
  69   0  ST  .022 TD(2,2)
  70   0  FI TD(3,3)
  71   0  ST 2.17 TD(3,3)
  72   0  ST  .066 TD(4,4)
  73   0  ST  .01 TD(5,5)
  74   0  ST  .202 TD(6,6)
  75   0  ST  .011 TD(7,7)
  76   0  ST 1.13 TD(8,8)
  77   0  ST 16.03 TD(9,9)
  78   0  ST  .027 TD(10,10)
  79   0  ST  .020 TD(11,11)
  80   0  ST 217 TD(12,12)
  81   0  ST  .013 TD(13,13)
  82   0  OU ML SE AL TVRSC
  83   0  END USER

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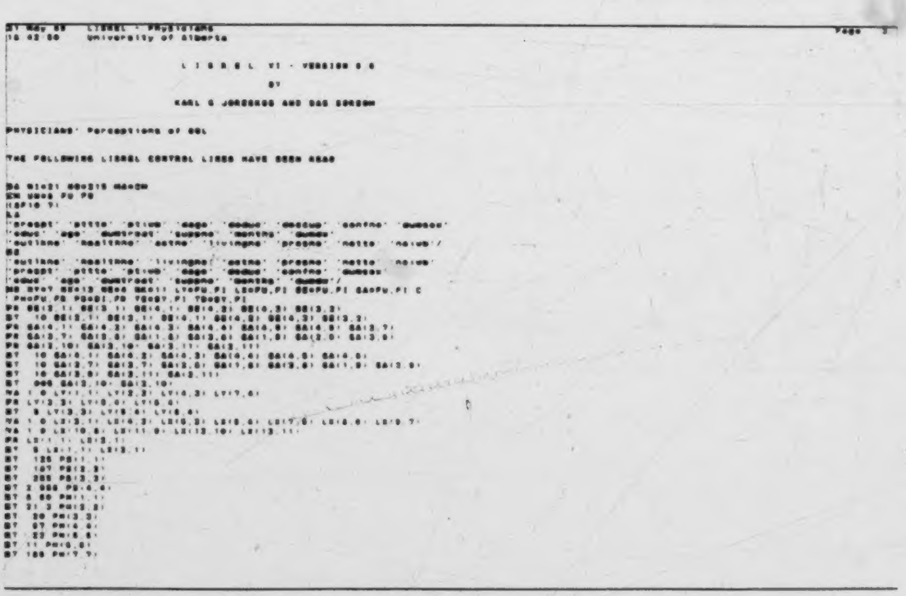

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31 May 89   LISREL - Physicians                                    Page 3
15 42 50    University of Alberta

                          L I S R E L  VI - VERSION 6.6

                                        BY

                          KARL G JORESKOG AND DAG SORBOM

PHYSICIANS' Perceptions of QOL

THE FOLLOWING LISREL CONTROL LINES HAVE BEEN READ

DA NI=21 NO=215 MA=CM
KM UNIT FU FO
(8F10.7)
LA
[illegible]
[illegible]
[illegible]
SE
[illegible]
[illegible]
[illegible]
MO NY=7 NX=13 NE=4 NK=11 LY=FU,FI LX=FU,FI BE=FU,FI GA=FU,FI C
 PH=FU,FR PS=DI,FR TE=SY,FI TD=SY,FI
FR BE(2,1) BE(3,1) BE(4,1) BE(4,2) BE(4,3) BE(3,2)
ST  .10 BE(2,1) BE(3,1) BE(4,1) BE(4,2) BE(4,3) BE(3,2)
FR GA(4,1) GA(4,2) GA(4,3) GA(4,4) GA(4,5) GA(4,5) GA(3,7)
FR GA(2,7) GA(3,8) GA(1,8) GA(3,8) GA(1,9) GA(2,9) GA(3,9)
FR GA(2,10) GA(3,10) GA(3,11) GA(3,11)
ST  .10 GA(4,1) GA(4,2) GA(4,3) GA(4,4) GA(4,5) GA(4,5)
ST  .10 GA(2,7) GA(3,7) GA(3,8) GA(1,8) GA(3,8) GA(1,9) GA(2,9)
ST  .10 GA(2,9) GA(3,11) GA(3,11)
ST  .066 GA(2,10) GA(3,10)
VA 1.0 LY(1,1) LY(2,2) LY(4,3) LY(7,4)
FR LY(3,3) LY(5,4) LY(6,4)
ST  .5 LY(3,3) LY(5,4) LY(6,4)
VA 1.0 LX(3,1) LX(4,2) LX(5,3) LX(6,4) LX(7,5) LX(8,6) LX(9,7)
VA 1.0 LX(10,8) LX(11,9) LX(12,10) LX(13,11)
FR LX(1,1) LX(2,1)
ST  .5 LX(1,1) LX(2,1)
ST  .125 PS(1,1)
ST  .107 PS(2,2)
ST  .285 PS(3,3)
ST 2.866 PS(4,4)
ST 8.80 PH(1,1)
ST 21.3 PH(2,2)
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ST  .11 PH(6,6)
ST 188 PH(7,7)
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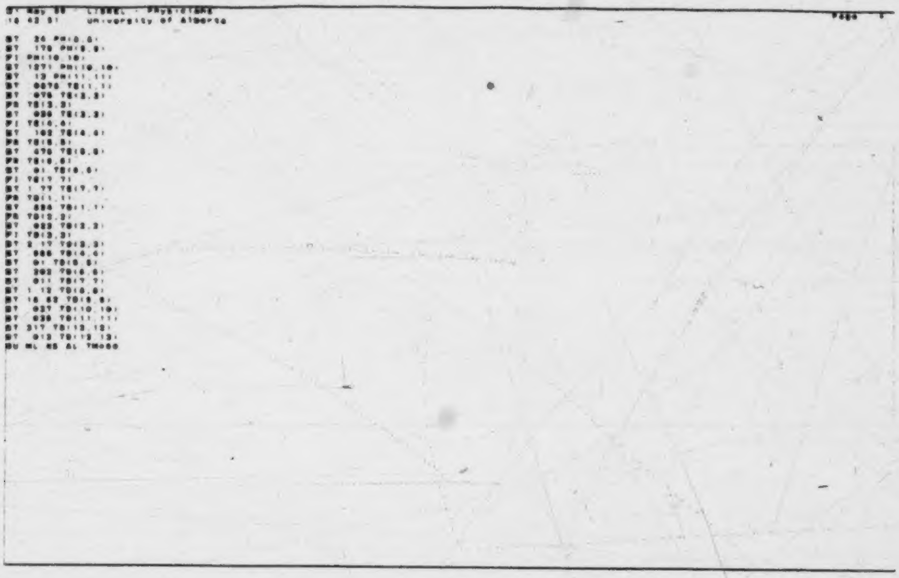

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18 42 51    University of Alberta

ST .24 PH(8,8)
ST .179 PH(9,9)
FI PH(10,10)
ST .1271 PH(10,10)
ST .13 PH(11,11)
ST .0076 TE(1,1)
ST .076 TE(2,2)
FR TE(3,3)
ST .036 TE(3,3)
FI TE(4,4)
ST .102 TE(4,4)
FR TE(5,5)
ST .476 TE(5,5)
FR TE(6,6)
ST .01 TE(6,6)
FI TE(7,7)
ST 1.77 TE(7,7)
FR TD(1,1)
ST .034 TD(1,1)
FR TD(2,2)
ST .023 TD(2,2)
FI TD(3,3)
ST 2.17 TD(3,3)
ST .066 TD(4,4)
ST .01 TD(5,5)
ST .302 TD(6,6)
ST .011 TD(7,7)
ST 1.12 TD(8,8)
ST 16.83 TD(9,9)
ST .037 TD(10,10)
ST .038 TD(11,11)
ST .317 TD(12,12)
ST .013 TD(13,13)
OU ML SE AL TM=60
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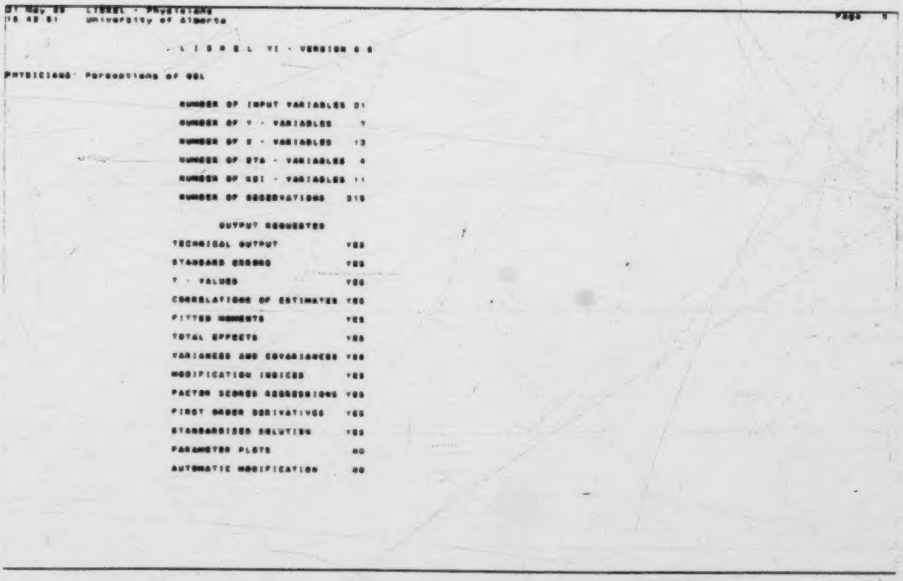

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31 May 89   LISREL - Physicians                                   Page
18 42 51    University of Alberta

                        - L I S R E L  VI - VERSION 6.6

PHYSICIANS' Perceptions of QOL

                         NUMBER OF INPUT VARIABLES 21
                         NUMBER OF Y - VARIABLES    7
                         NUMBER OF X - VARIABLES   13
                         NUMBER OF ETA - VARIABLES  6
                         NUMBER OF KSI - VARIABLES 11
                         NUMBER OF OBSERVATIONS   316

                              OUTPUT REQUESTED
                        TECHNICAL OUTPUT            YES
                        STANDARD ERRORS             YES
                        T - VALUES                  YES
                        CORRELATIONS OF ESTIMATES   YES
                        FITTED MOMENTS              YES
                        TOTAL EFFECTS               YES
                        VARIANCES AND COVARIANCES   YES
                        MODIFICATION INDICES        YES
                        FACTOR SCORES REGRESSIONS   YES
                        FIRST ORDER DERIVATIVES     YES
                        STANDARDIZED SOLUTION       YES
                        PARAMETER PLOTS              NO
                        AUTOMATIC MODIFICATION       NO
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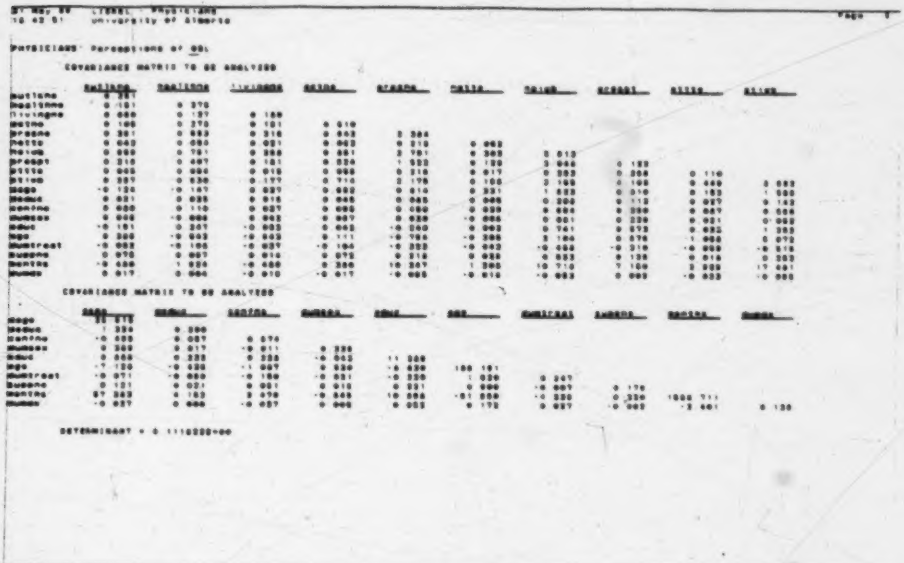
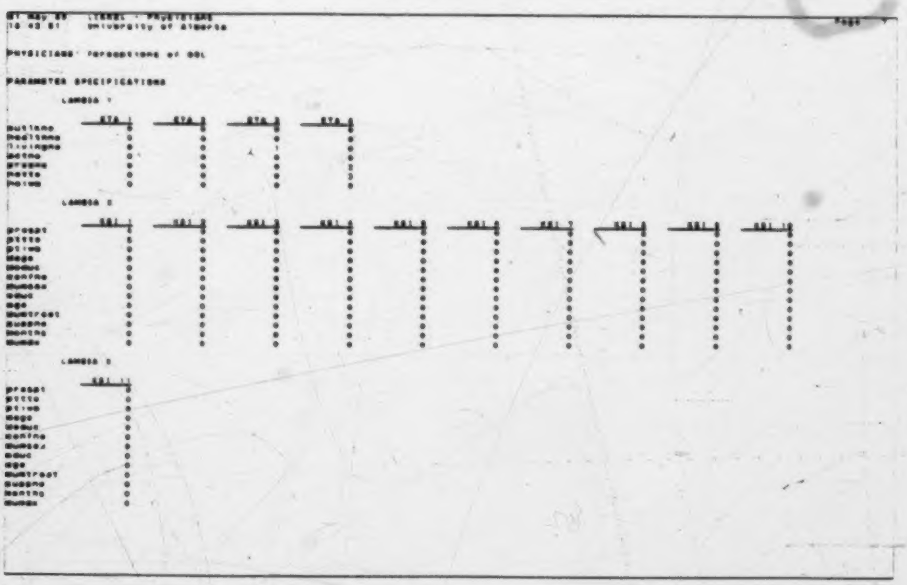


University of Alberta

PHYSICIANS' Perceptions of QOL

COVARIANCE MATRIX TO BE ANALYZED

COVARIANCE MATRIX TO BE ANALYZED



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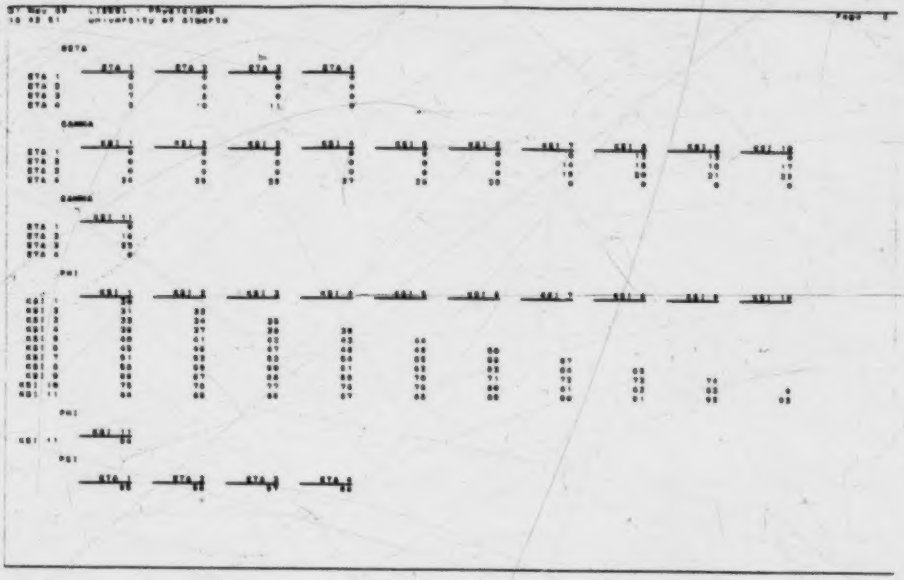
PHYSICIANS' Perceptions of QOL

PARAMETER SPECIFICATIONS

LAMBDA Y

LAMBDA X

LAMBDA X



University of Alberta

BETA

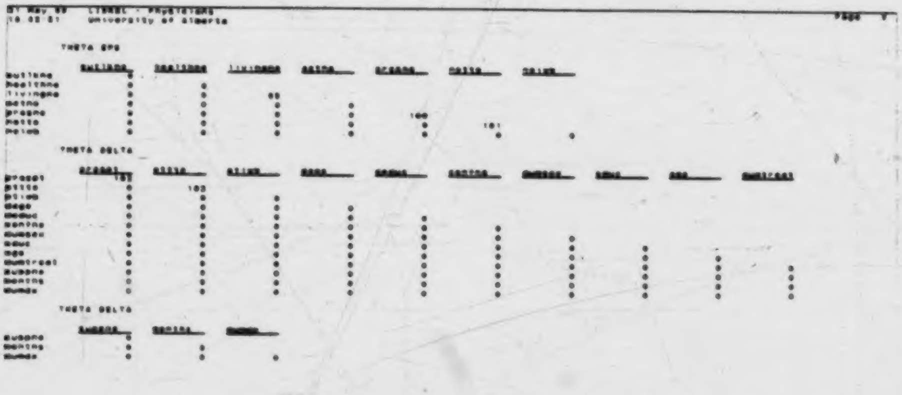
GAMMA

GAMMA

PHI

PHI

PSI

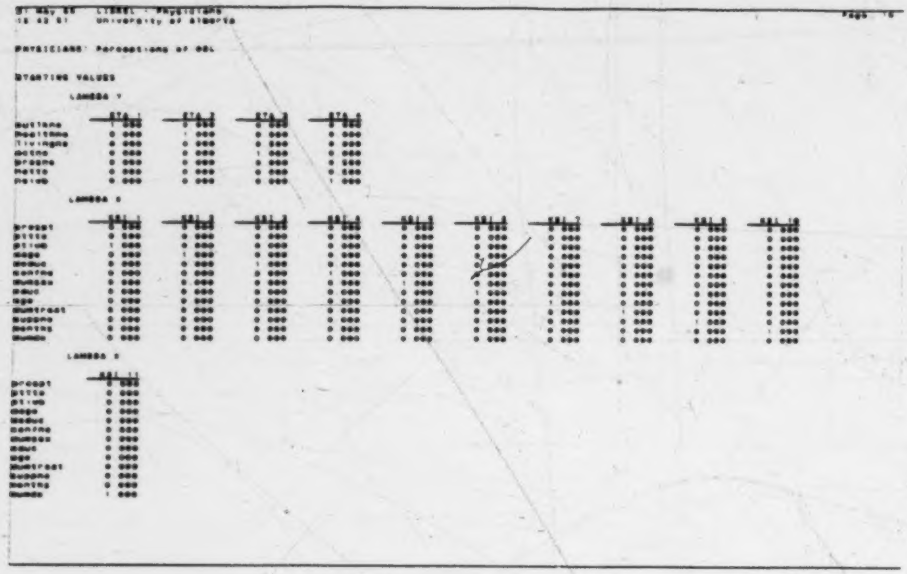


University of Alberta

THETA EPS

THETA DELTA

THETA DELTA



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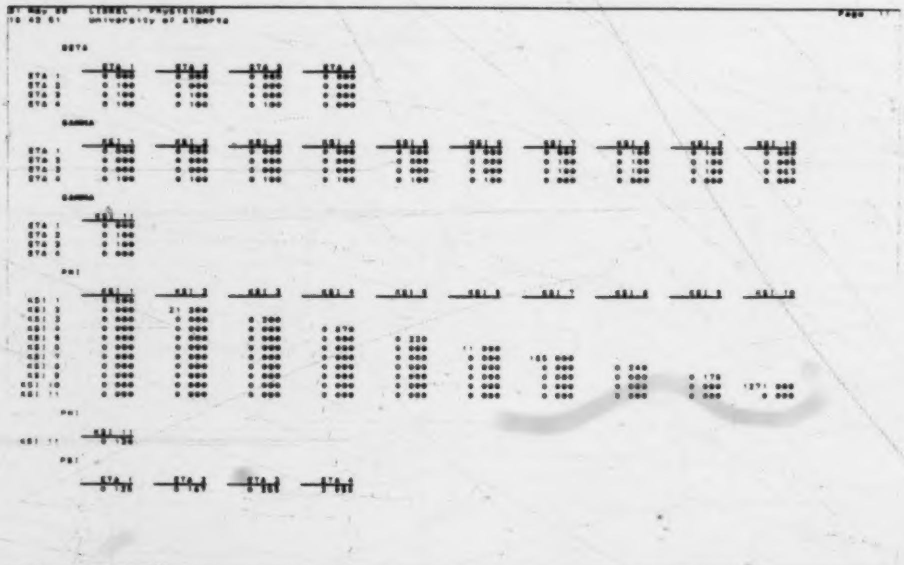
PHYSICIANS' Perceptions of QOL

STARTING VALUES

LAMBDA Y

LAMBDA X

LAMBDA X



LISREL - Physicians
University of Alberta

BETA

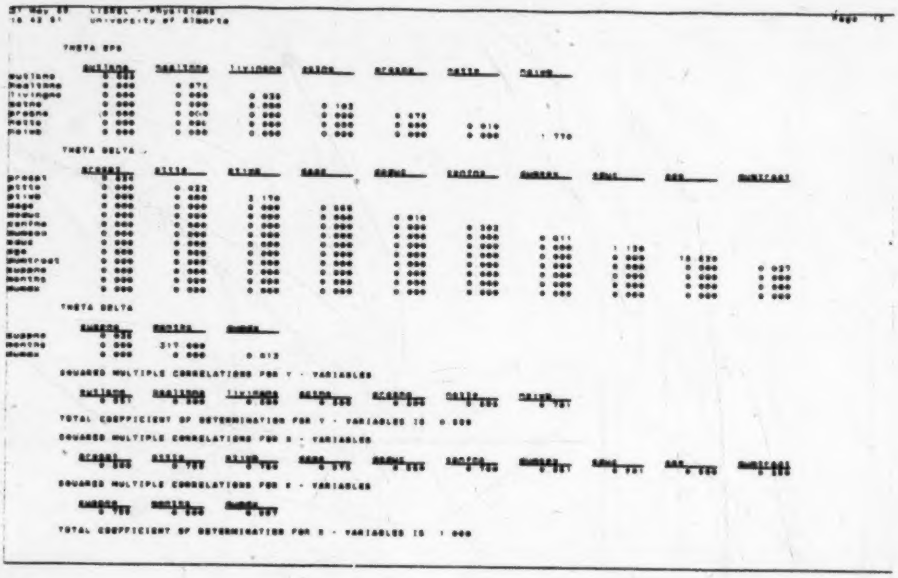
GAMMA

GAMMA

PHI

PHI

PSI



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        LISREL - PHYSICIANS
        UNIVERSITY OF ALBERTA

   THETA EPS

   THETA DELTA

   THETA DELTA

   SQUARED MULTIPLE CORRELATIONS FOR Y - VARIABLES

   TOTAL COEFFICIENT OF DETERMINATION FOR Y - VARIABLES IS

   SQUARED MULTIPLE CORRELATIONS FOR X - VARIABLES

   SQUARED MULTIPLE CORRELATIONS FOR X - VARIABLES

   TOTAL COEFFICIENT OF DETERMINATION FOR X - VARIABLES IS
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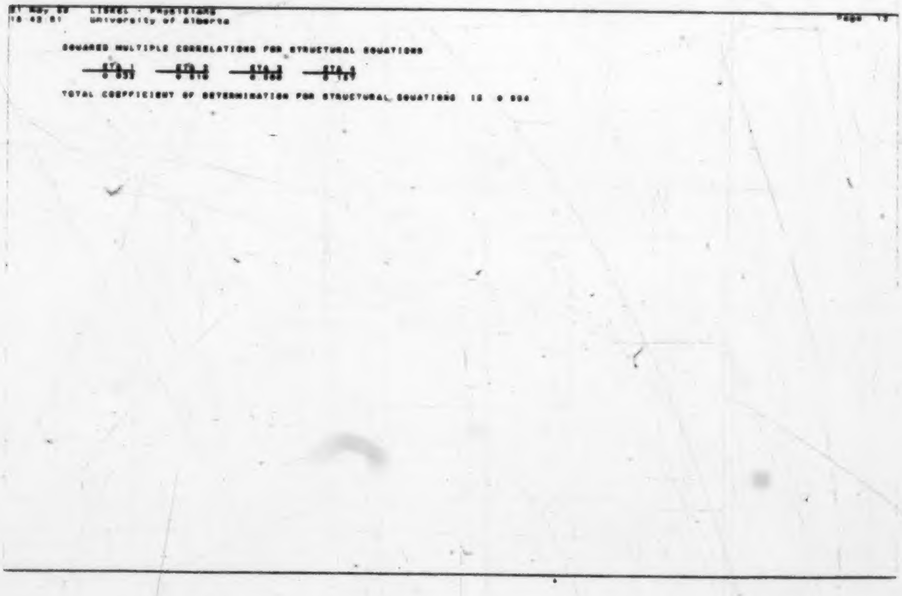

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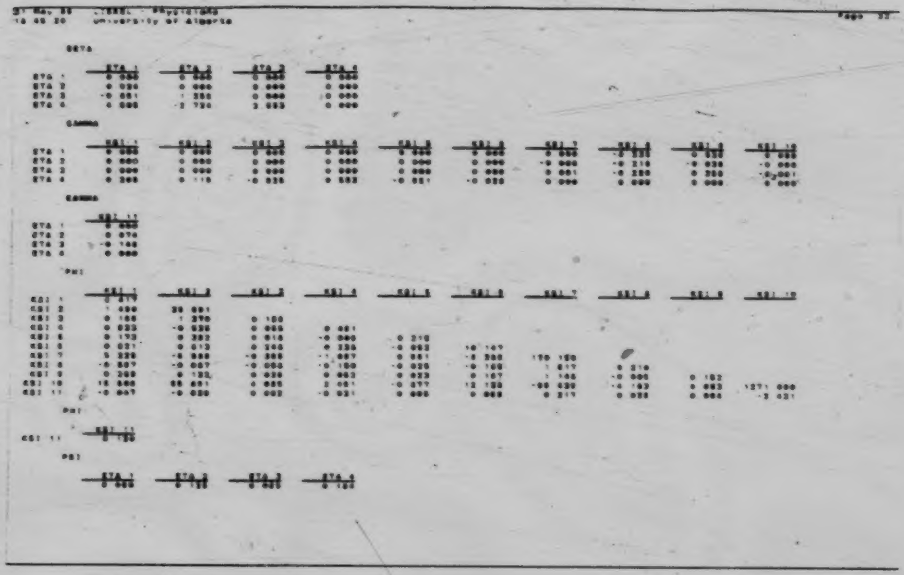
        LISREL - PHYSICIANS
        UNIVERSITY OF ALBERTA

   SQUARED MULTIPLE CORRELATIONS FOR STRUCTURAL EQUATIONS

   TOTAL COEFFICIENT OF DETERMINATION FOR STRUCTURAL EQUATIONS  IS
```



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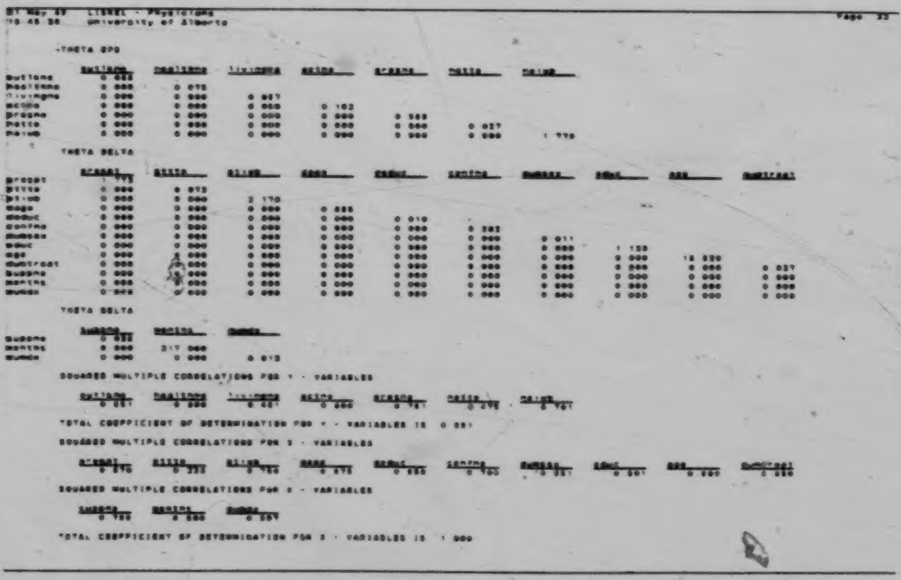
BETA

GAMMA

PHI

PSI



University of Alberta

THETA EPS

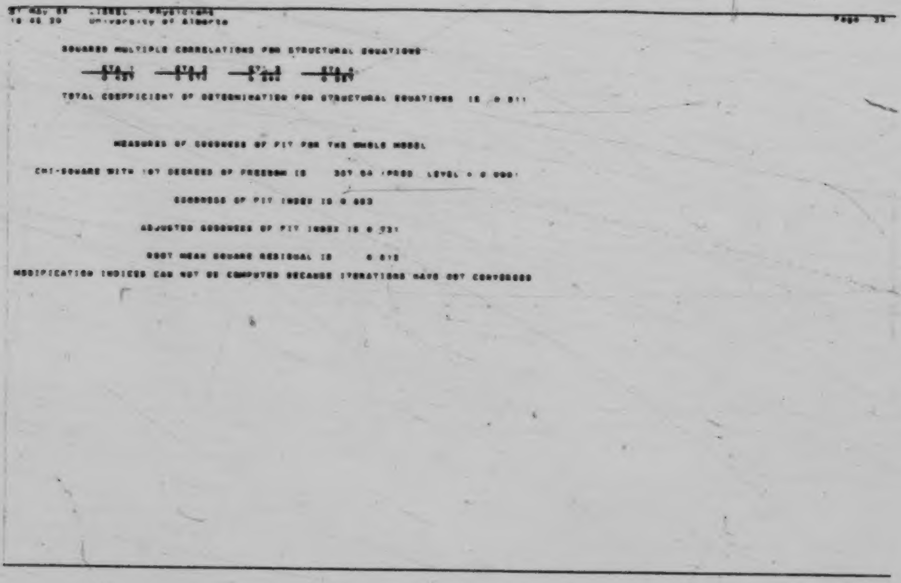
THETA DELTA

SQUARED MULTIPLE CORRELATIONS FOR Y - VARIABLES

TOTAL COEFFICIENT OF DETERMINATION FOR Y - VARIABLES IS

SQUARED MULTIPLE CORRELATIONS FOR X - VARIABLES

TOTAL COEFFICIENT OF DETERMINATION FOR X - VARIABLES IS



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[illegible] LISREL - PHYSICIANS
[illegible]   University of Alberta                                    Page [illegible]

     SQUARED MULTIPLE CORRELATIONS FOR STRUCTURAL EQUATIONS

        ETA 1      ETA 2      ETA 3      ETA 4
     [illegible] [illegible] [illegible] [illegible]

     TOTAL COEFFICIENT OF DETERMINATION FOR STRUCTURAL EQUATIONS  IS  [illegible]

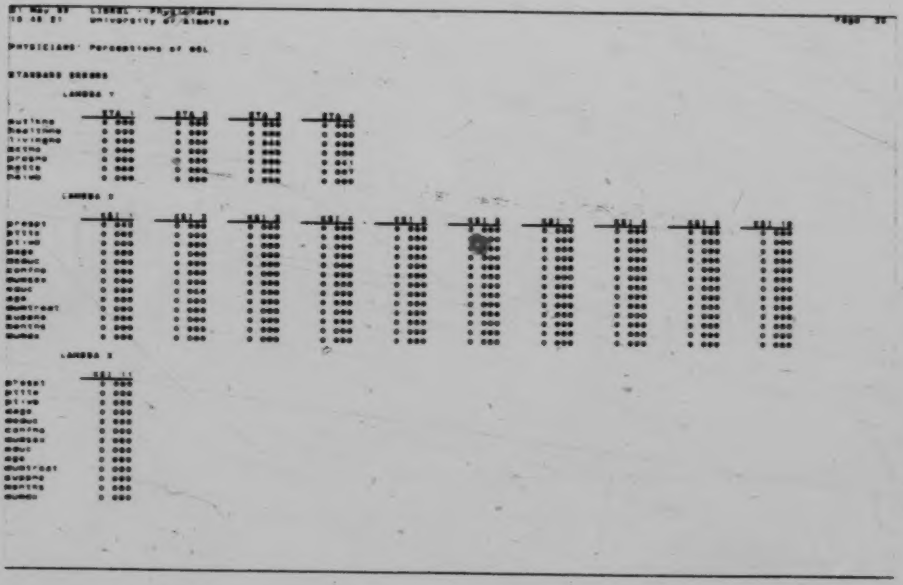
          MEASURES OF GOODNESS OF FIT FOR THE WHOLE MODEL

  CHI-SQUARE WITH 107 DEGREES OF FREEDOM IS    307.04 (PROB. LEVEL = 0.000)

                   GOODNESS OF FIT INDEX IS [illegible]

               ADJUSTED GOODNESS OF FIT INDEX IS [illegible]

               ROOT MEAN SQUARE RESIDUAL IS     [illegible]
MODIFICATION INDICES CAN NOT BE COMPUTED BECAUSE ITERATIONS HAVE NOT CONVERGED
```



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[illegible] LISREL - PHYSICIANS
[illegible]   University of Alberta                                    Page [illegible]

PHYSICIANS' Perceptions of QOL

STANDARD ERRORS

        LAMBDA Y

        ETA 1   ETA 2   ETA 3   ETA 4

        LAMBDA X

        KSI 1   KSI 2   KSI 3   KSI 4   KSI 5   KSI 6   KSI 7   KSI 8   KSI 9   KSI 10

        LAMBDA X

        KSI 11
```

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[illegible] May [illegible]   LISREL - Physicians
[illegible]   University of Alberta                                   Page [illegible]

        BETA

              ETA 1       ETA 2       ETA 3       ETA 4
 ETA 1    [illegible] [illegible] [illegible] [illegible]
 ETA 2    [illegible] [illegible] [illegible] [illegible]
 ETA 3    [illegible] [illegible] [illegible] [illegible]
 ETA 4    [illegible] [illegible] [illegible] [illegible]

        GAMMA

              KSI 1       KSI 2       KSI 3       KSI 4       KSI 5       KSI 6       KSI 7       KSI 8       KSI 9       KSI 10
 ETA 1    [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]
 ETA 2    [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]
 ETA 3    [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]
 ETA 4    [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

        GAMMA

              KSI 11
 ETA 1    [illegible]
 ETA 2    [illegible]
 ETA 3    [illegible]
 ETA 4    [illegible]

        PHI

              KSI 1       KSI 2       KSI 3       KSI 4       KSI 5       KSI 6       KSI 7       KSI 8       KSI 9       KSI 10
 KSI 1    [illegible]
 KSI 2    [illegible] [illegible]
 KSI 3    [illegible] [illegible] [illegible]
 KSI 4    [illegible] [illegible] [illegible] [illegible]
 KSI 5    [illegible] [illegible] [illegible] [illegible] [illegible]
 KSI 6    [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]
 KSI 7    [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]
 KSI 8    [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]
 KSI 9    [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]
 KSI 10   [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]
 KSI 11   [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

        PHI

              KSI 11
 KSI 11   [illegible]

        PSI

              ETA 1       ETA 2       ETA 3       ETA 4
          [illegible] [illegible] [illegible] [illegible]
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[illegible] May [illegible]   LISREL - Physicians
[illegible]   University of Alberta                                   Page [illegible]

        THETA EPS

           [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]
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[illegible] [illegible] [illegible]
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        THETA DELTA

           [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]
[illegible] [illegible]
[illegible] [illegible] [illegible]
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        THETA DELTA

           [illegible] [illegible] [illegible]
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[illegible] [illegible] [illegible] [illegible]
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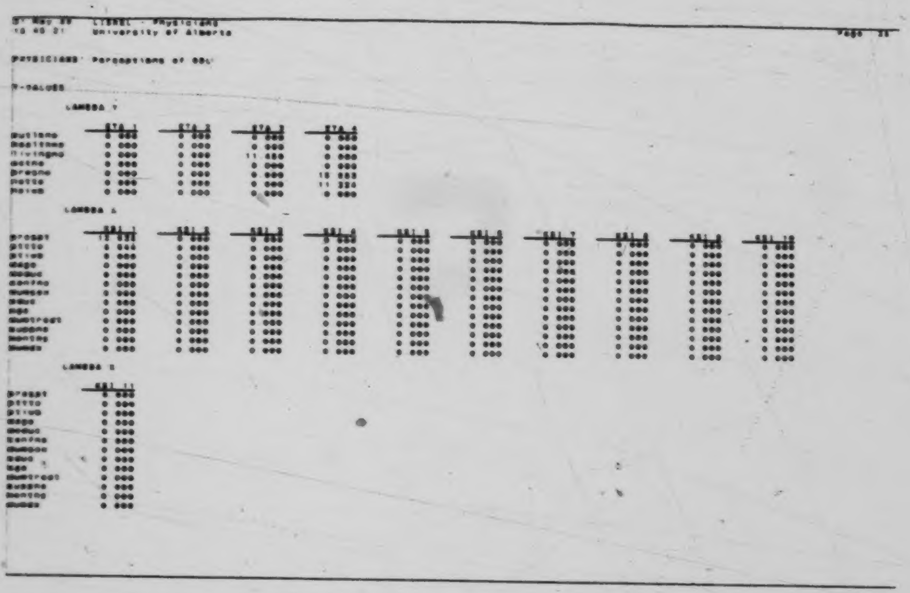

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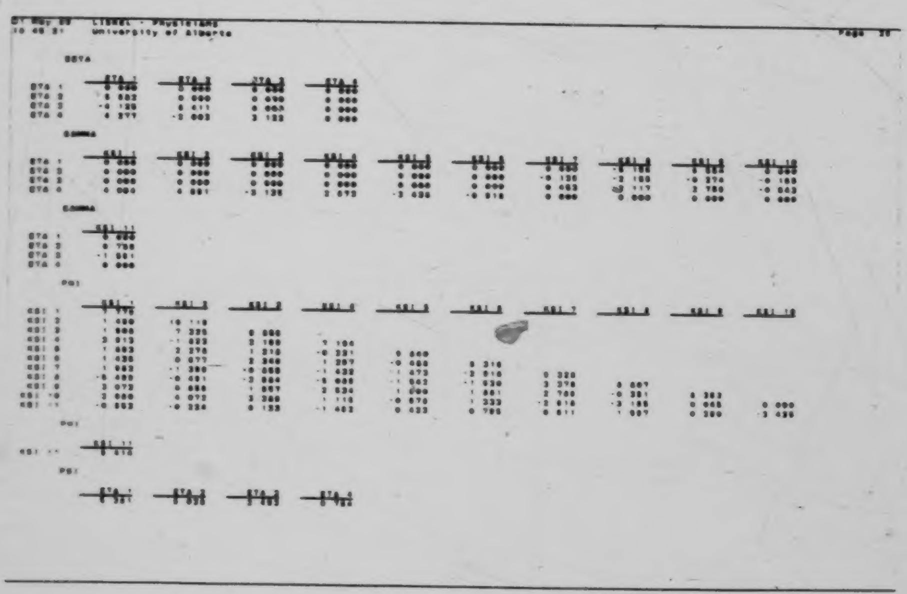
PHYSICIANS' Perceptions of QOL

T-VALUES

LAMBDA Y

LAMBDA X

LAMBDA X



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BETA

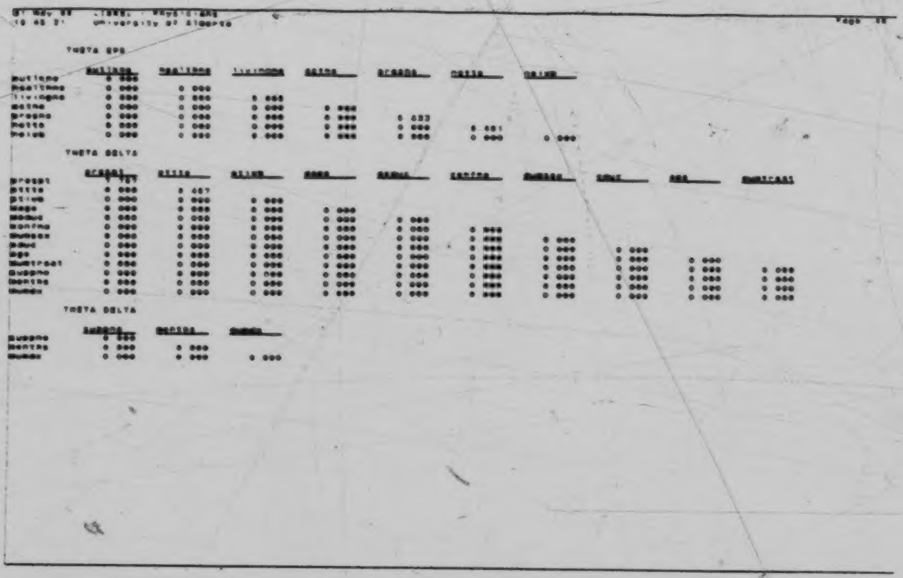
GAMMA

GAMMA

PSI

PSI

PSI



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THETA EPS

THETA DELTA

THETA DELTA

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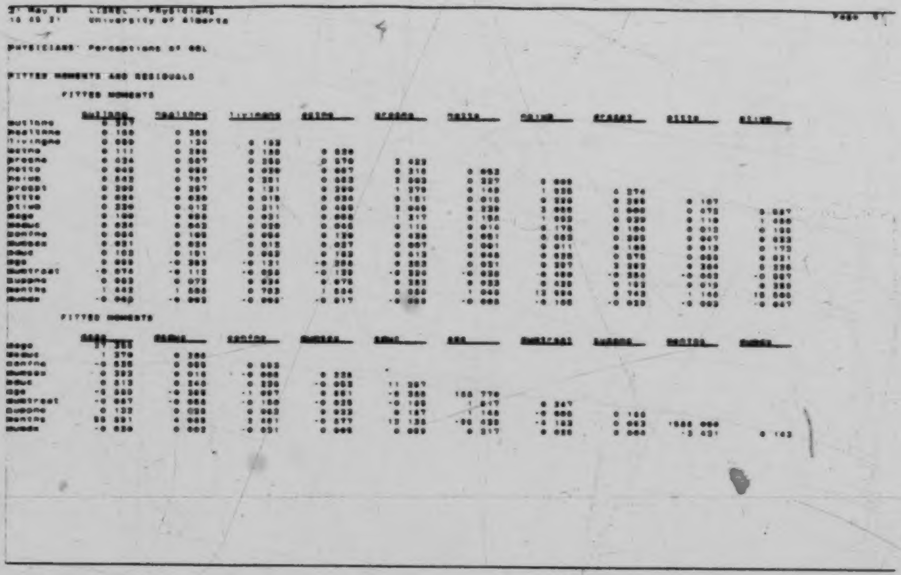
University of Alberta

PHYSICIANS: Perceptions of QOL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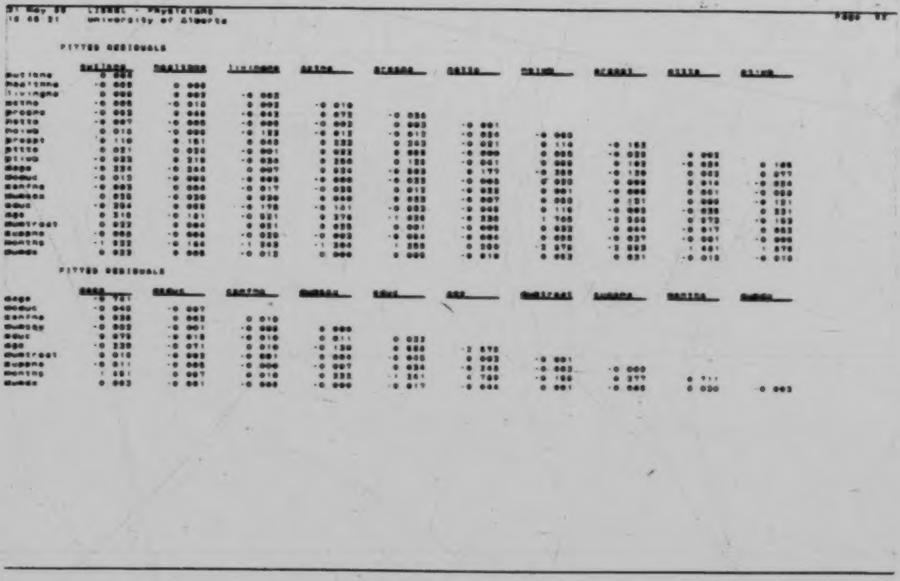
PHYSICIANS' Perceptions of QOL

FITTED MOMENTS AND RESIDUALS

FITTED MOMENTS

FITTED MOMENTS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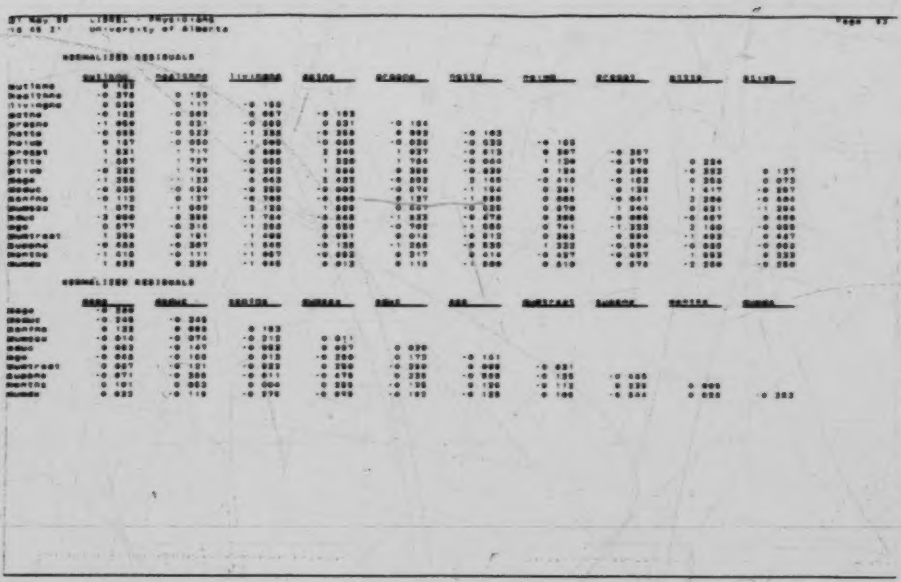
FITTED RESIDUALS

FITTED RESIDUALS



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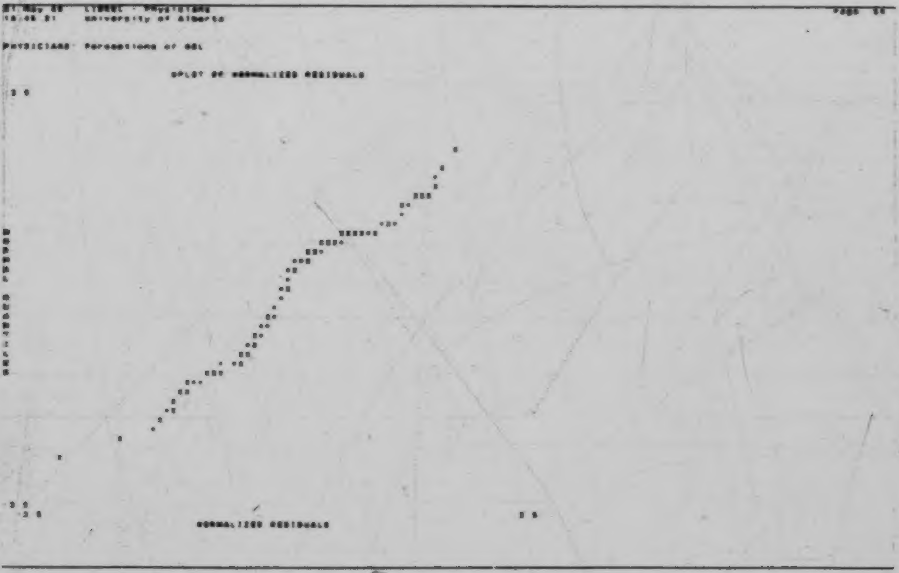
NORMALIZED RESIDUALS

NORMALIZED RESIDUALS



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PHYSICIANS: Perceptions of QOL

QPLOT OF NORMALIZED RESIDUALS

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31 May 89   LISREL - PHYSICIANS
15 45 21    University of Alberta                                         Page [illegible]

PHYSICIANS' Perceptions of QOL

TOTAL EFFECTS

        TOTAL EFFECTS OF KSI ON ETA

           KSI 1     KSI 2     KSI 3     KSI 4     KSI 5     KSI 6     KSI 7     KSI 8     KSI 9     KSI 10
 ETA 1   [illegible]
 ETA 2   [illegible]
 ETA 3   [illegible]
 ETA 4   [illegible]

        TOTAL EFFECTS OF KSI ON ETA

           KSI 11
 ETA 1   [illegible]
 ETA 2   [illegible]
 ETA 3   [illegible]
 ETA 4   [illegible]

        TOTAL EFFECTS OF KSI ON Y

           KSI 1     KSI 2     KSI 3     KSI 4     KSI 5     KSI 6     KSI 7     KSI 8     KSI 9     KSI 10
[illegible]

        TOTAL EFFECTS OF KSI ON Y

           KSI 11
[illegible]

        TOTAL EFFECTS OF ETA ON ETA

           ETA 1     ETA 2     ETA 3     ETA 4
 ETA 1   [illegible]
 ETA 2   [illegible]
 ETA 3   [illegible]
 ETA 4   [illegible]

LARGEST EIGENVALUE OF (I-BETA)*(I-BETA)-TRANSPOSED (STABILITY INDEX) IS [illegible]
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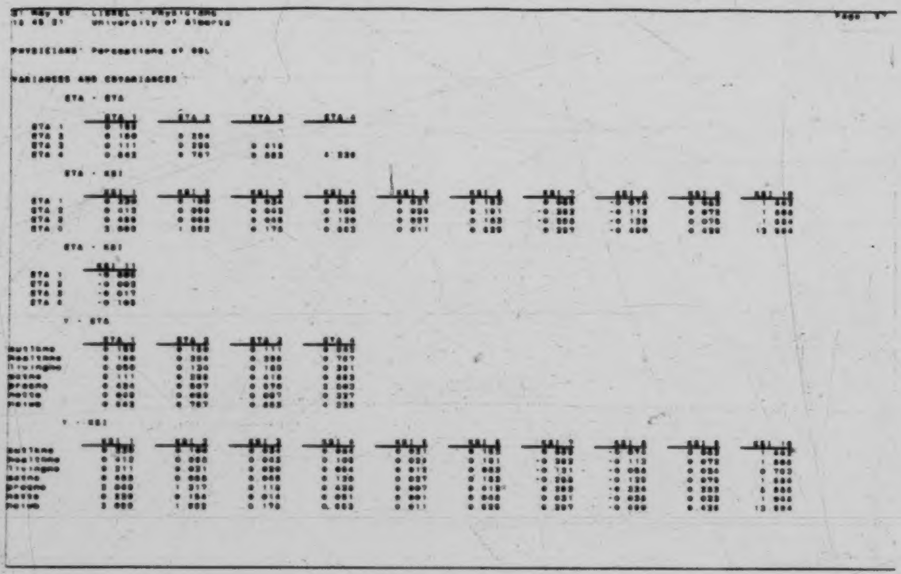
31 May 89   LISREL - PHYSICIANS
15 45 21    University of Alberta                                         Page [illegible]

        TOTAL EFFECTS OF ETA ON Y

           ETA 1     ETA 2     ETA 3     ETA 4
[illegible]
```



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PHYSICIANS' Perceptions of QOL

VARIANCES AND COVARIANCES

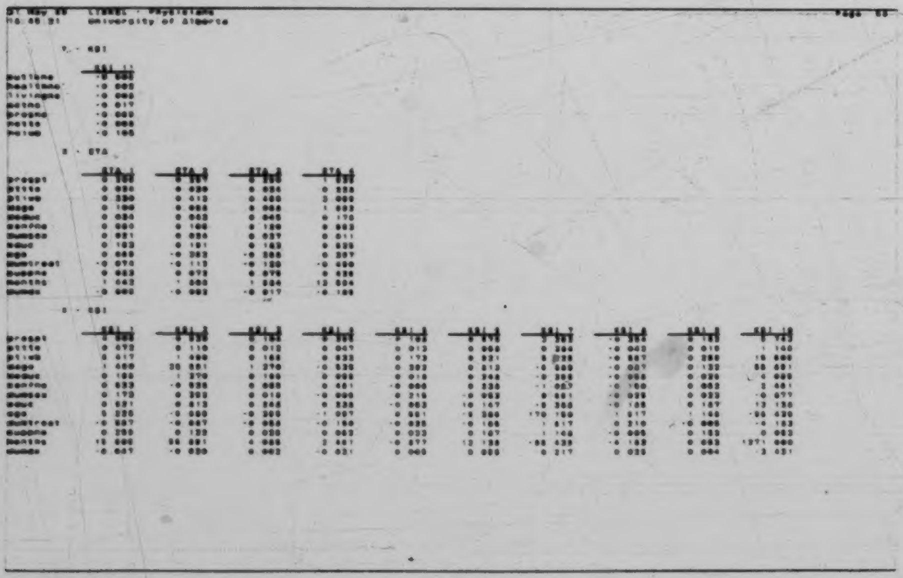
ETA - ETA

ETA - KSI

ETA - KSI

Y - ETA

Y - KSI



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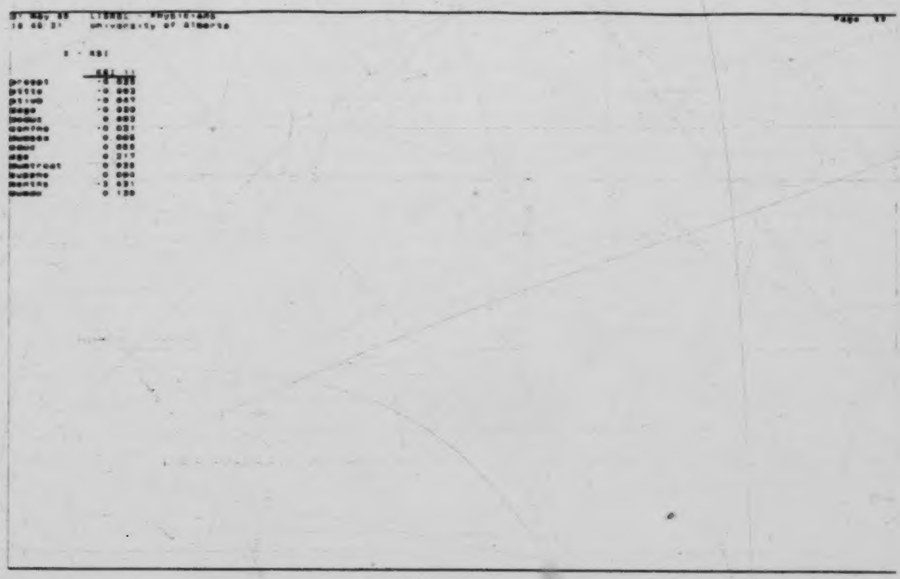
Y - KSI

X - ETA

X - KSI



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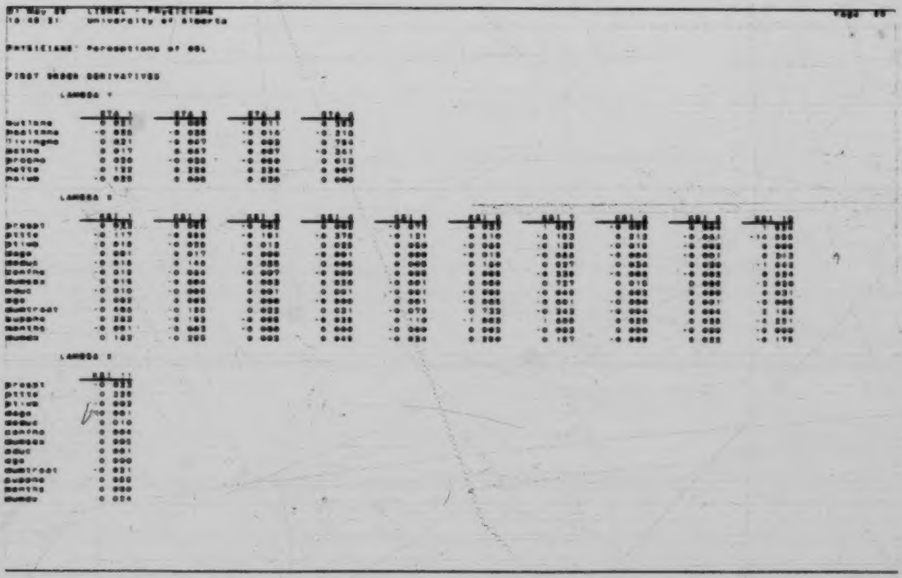

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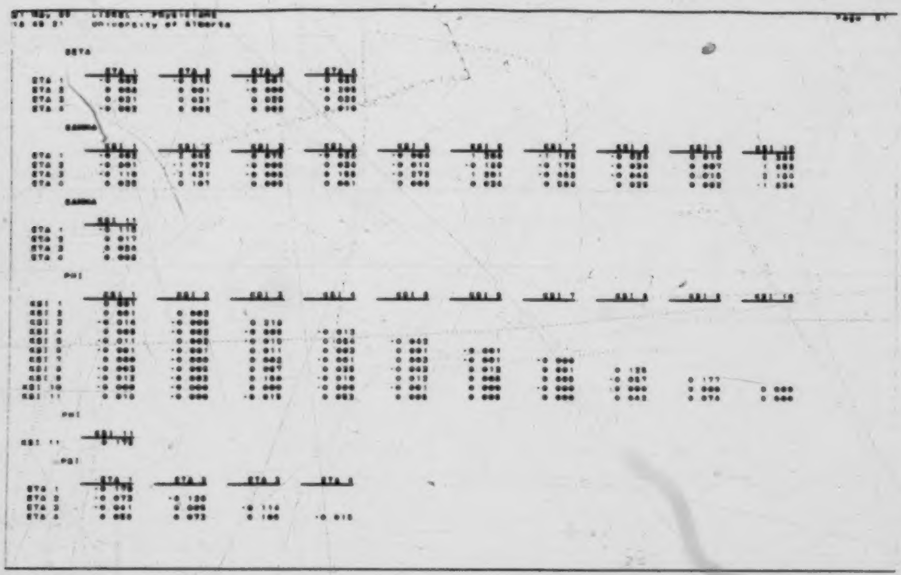
PHYSICIANS' Perceptions of QOL

FIRST ORDER DERIVATIVES

LAMBDA Y

LAMBDA X


University of Alberta

BETA

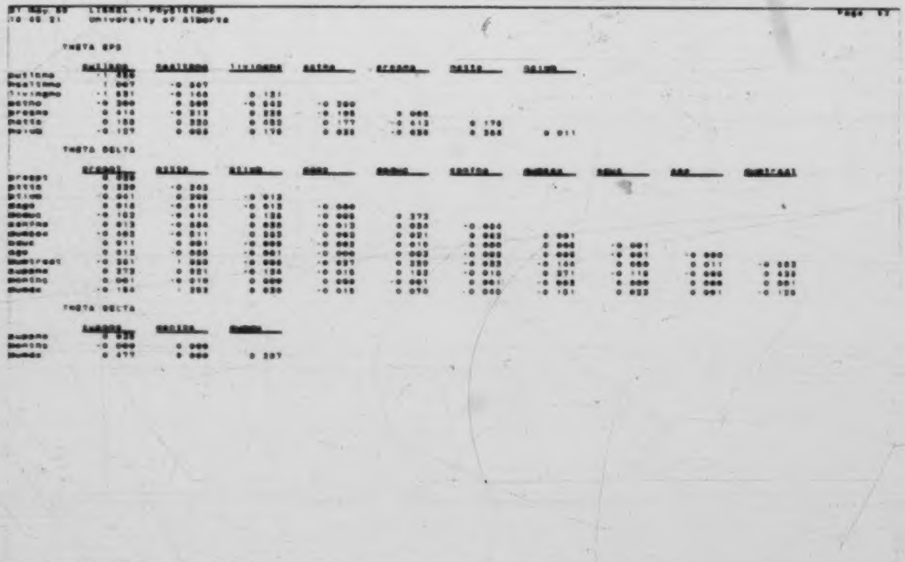
GAMMA

GAMMA

PHI

PHI

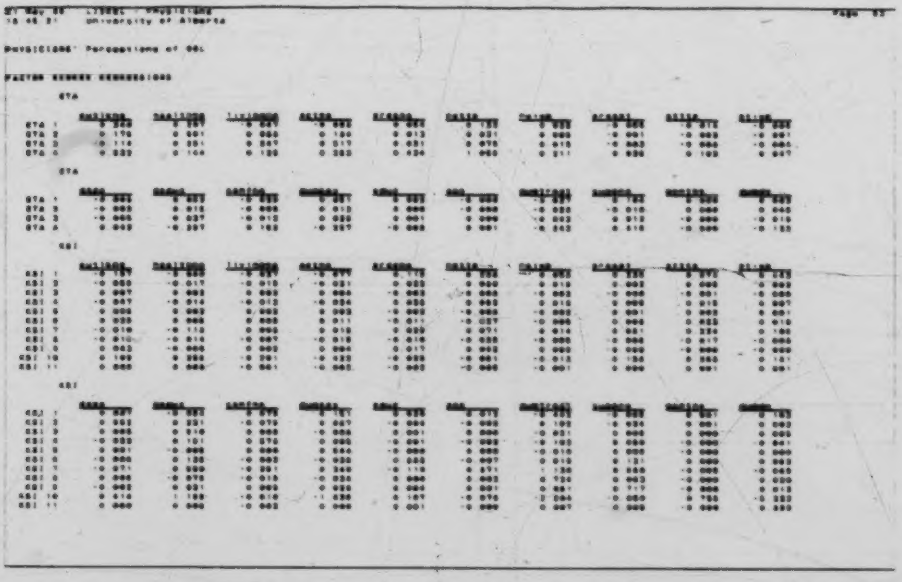
PSI


University of Alberta

THETA EPS

THETA DELTA

THETA DELTA



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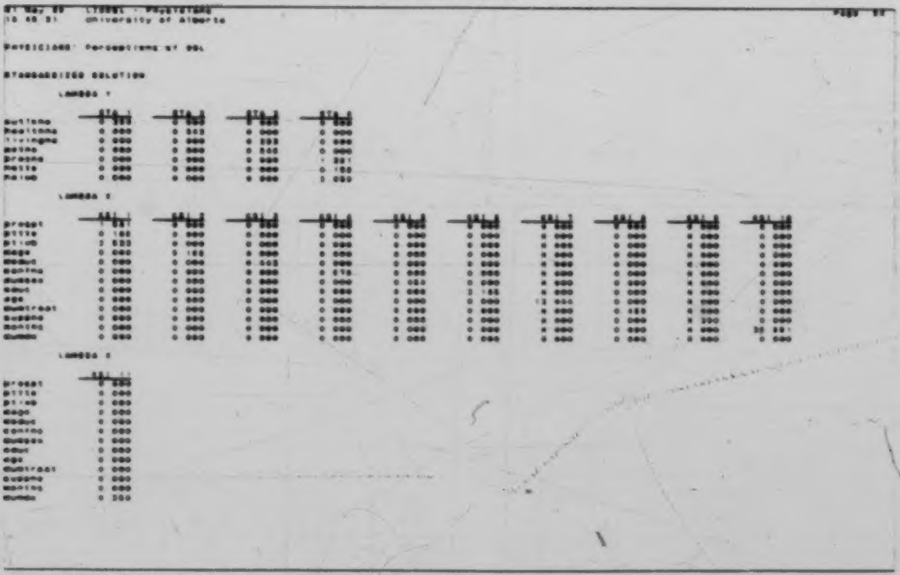
PHYSICIANS' Perceptions of [illegible]

FACTOR SCORES REGRESSIONS

ETA

KSI



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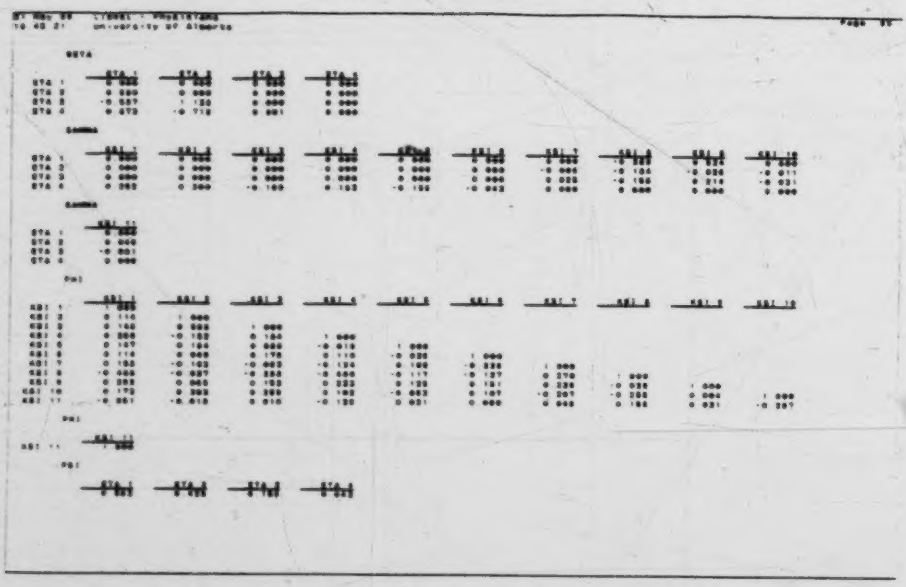
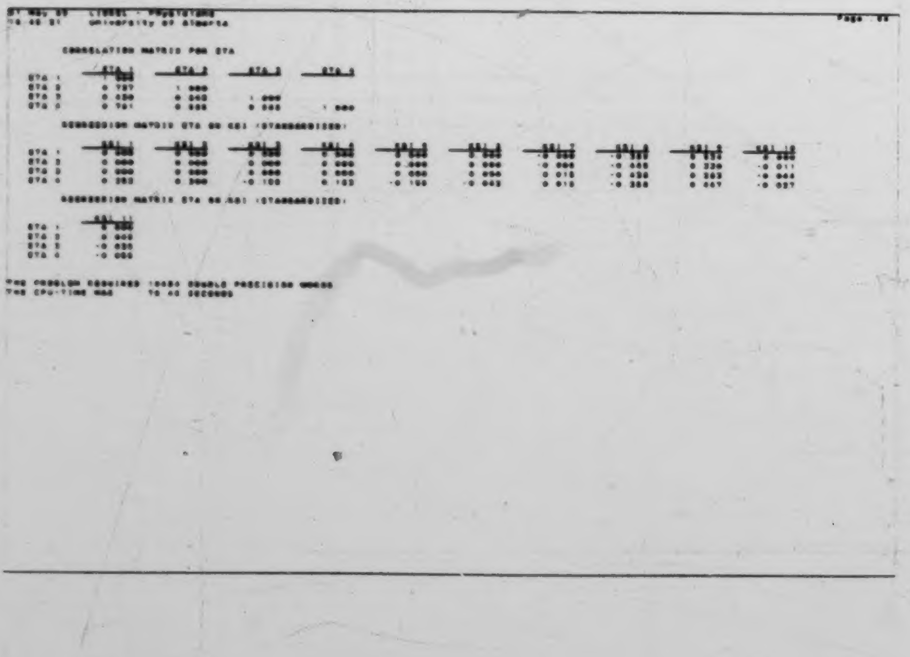
PHYSICIANS' Perceptions of [illegible]

STANDARDIZED SOLUTION

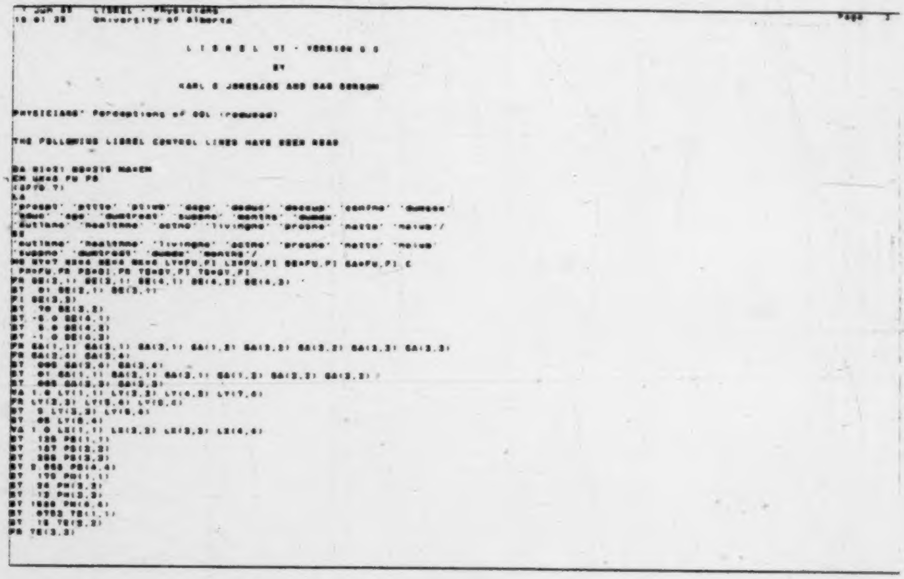
LAMBDA Y

LAMBDA X





Appendix 12: LISREL Model of Physicians' Perceptions of QOL of Patients with ESRD (Reduced)



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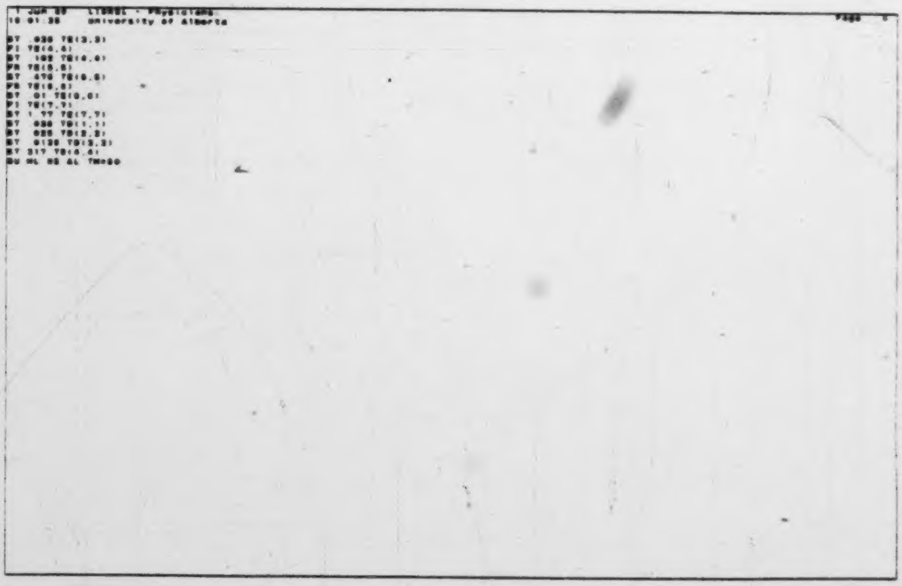
                    L I S R E L  VI - VERSION 6.5

                                BY

                    KARL G JORESKOG AND DAG SORBOM

PHYSICIANS' Perceptions of QOL (reduced)

THE FOLLOWING LISREL CONTROL LINES HAVE BEEN READ
```



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10 01 38    University of Alberta
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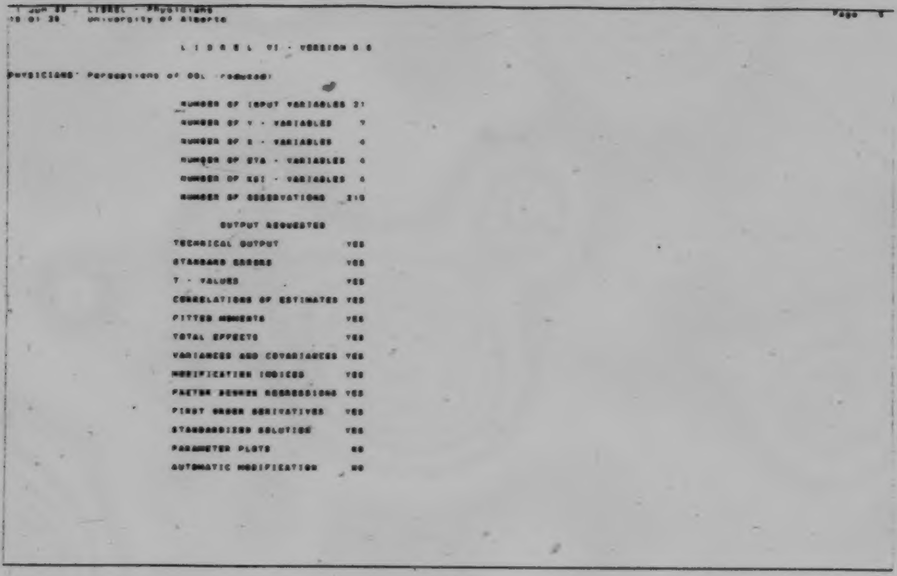

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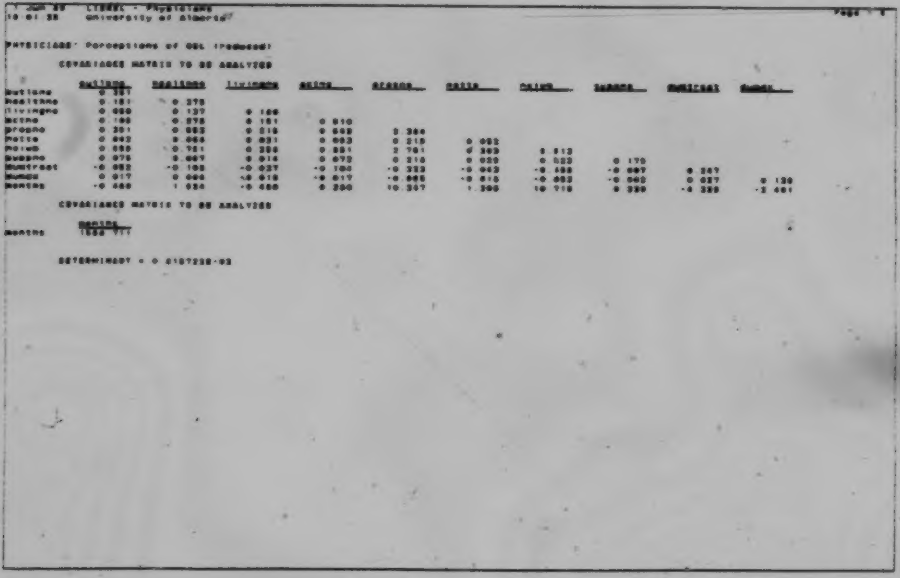
                              L I S R E L  VI - VERSION 6.6

PHYSICIANS' Perceptions of QOL (reduced)

                              NUMBER OF INPUT VARIABLES 21
                              NUMBER OF Y - VARIABLES    7
                              NUMBER OF X - VARIABLES    4
                              NUMBER OF ETA - VARIABLES  4
                              NUMBER OF KSI - VARIABLES  4
                              NUMBER OF OBSERVATIONS   210

                                    OUTPUT REQUESTED
                             TECHNICAL OUTPUT             YES
                             STANDARD ERRORS              YES
                             T - VALUES                   YES
                             CORRELATIONS OF ESTIMATES    YES
                             FITTED MOMENTS               YES
                             TOTAL EFFECTS                YES
                             VARIANCES AND COVARIANCES    YES
                             MODIFICATION INDICES         YES
                             FACTOR SCORES REGRESSIONS    YES
                             FIRST ORDER DERIVATIVES      YES
                             STANDARDIZED SOLUTION        YES
                             PARAMETER PLOTS               NO
                             AUTOMATIC MODIFICATION        NO
```



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PHYSICIANS' Perceptions of QOL (reduced)

        COVARIANCE MATRIX TO BE ANALYZED

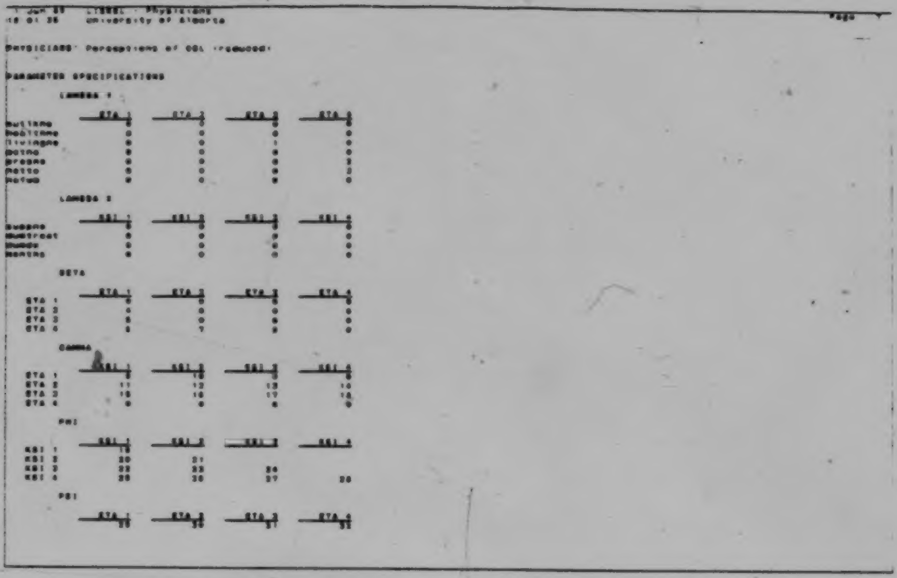
           [illegible]  [illegible]  [illegible]  [illegible]  [illegible]  [illegible]  [illegible]  [illegible]  [illegible]  [illegible]
[illegible]    0.381
[illegible]    0.181        0.378
[illegible]    0.080        0.137        0.100
[illegible]    0.190        0.278        0.161        0.810
[illegible]    0.301        0.083        0.318        0.043        3.304
[illegible]    0.042        0.068        0.031        0.003        0.215        0.052
[illegible]    0.050        0.751        0.286        0.581        2.701        0.303        3.813
[illegible]    0.075        0.007        0.014        0.072        0.316        0.020        0.423        0.170
[illegible]   -0.052       -0.108       -0.027       -0.104       -0.323       -0.043       -0.488       -0.007        0.367
[illegible]    0.017        0.006       -0.018       -0.017       -0.065       -0.016       -0.083       -0.002        0.027        0.120
months        -0.480        1.024       -0.480        0.200       10.307        1.308       10.718        0.330       -4.330       -2.401

        COVARIANCE MATRIX TO BE ANALYZED

             months
months      1688.771

        DETERMINANT = 0.618723D-03
```

J



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PHYSICIANS' Perceptions of QOL (reduced)

PARAMETER SPECIFICATIONS

         LAMBDA Y

             ETA 1       ETA 2       ETA 3       ETA 4
sutlane          0           0           0           0
reoltane         0           0           0           0
livingne         0           0           1           0
potne            0           0           0           0
prosne           0           0           0           2
potto            0           0           0           3
potub            0           0           0           0

         LAMBDA X

             XSI 1       XSI 2       XSI 3       XSI 4
suppne           0           0           0           0
sumtreat         0           0           0           0
sumdx            0           0           0           0
months           0           0           0           0

         BETA

             ETA 1       ETA 2       ETA 3       ETA 4
  ETA 1          0           0           0           0
  ETA 2          4           0           0           0
  ETA 3          5           0           0           0
  ETA 4          6           7           8           0

         GAMMA

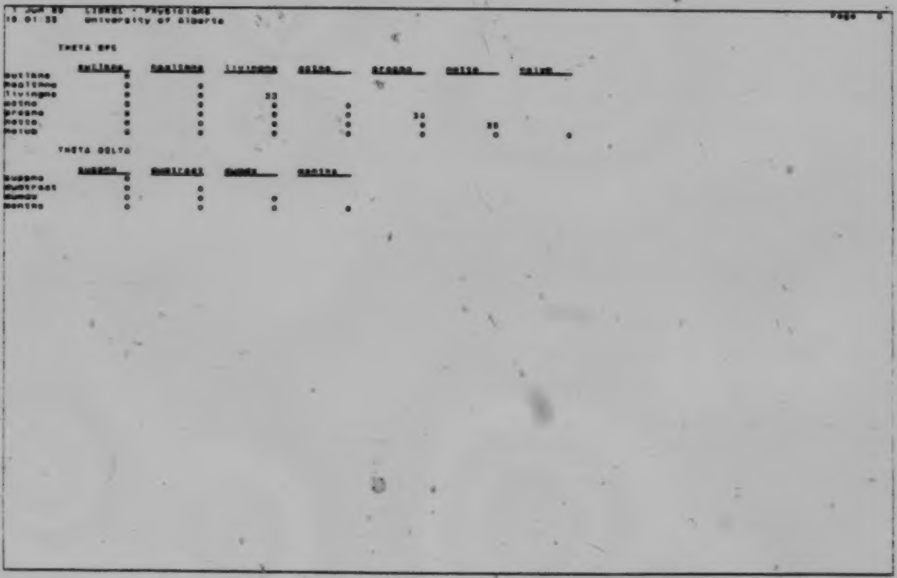
             XSI 1       XSI 2       XSI 3       XSI 4
  ETA 1          9          10           0           0
  ETA 2         11          12          13          14
  ETA 3         15          16          17          18
  ETA 4          0           0           0           0

         PHI

             XSI 1       XSI 2       XSI 3       XSI 4
  XSI 1         19
  XSI 2         20          21
  XSI 3         22          23          24
  XSI 4         25          26          27          28

         PSI

             ETA 1       ETA 2       ETA 3       ETA 4
                29          30          31          32
```



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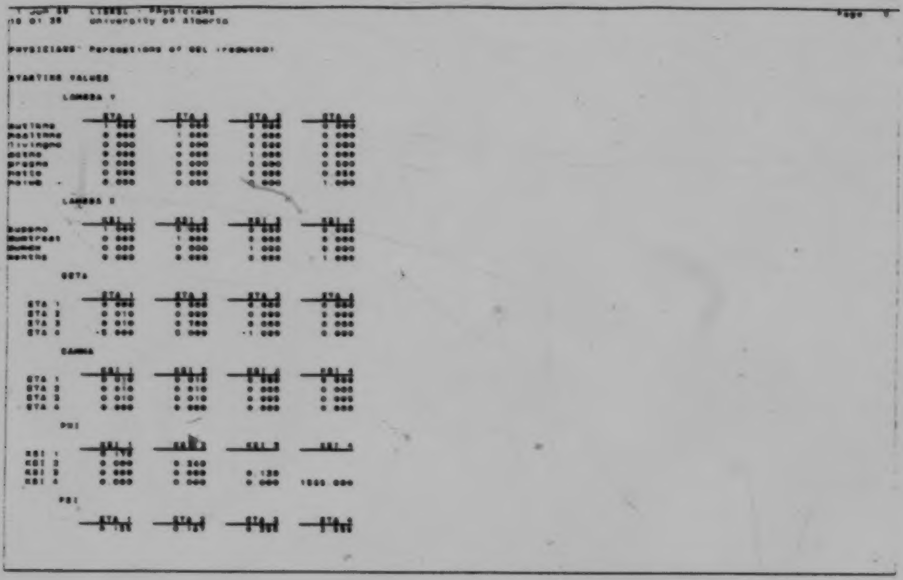
         THETA EPS

             sutlane     reoltane    livingne    potne       prosne      potto       potub
sutlane          0
reoltane         0           0
livingne         0           0          33
potne            0           0           0           0
prosne           0           0           0           0          34
potto            0           0           0           0           0          35
potub            0           0           0           0           0           0           0

         THETA DELTA

             suppne      sumtreat    sumdx       months
suppne           0
sumtreat         0           0
sumdx            0           0           0
months           0           0           0           0
```



```
[illegible]         LISREL - PHYSICIANS
[illegible]         University of Alberta

PHYSICIANS' Perceptions of QOL (reduced)

STARTING VALUES

        LAMBDA Y

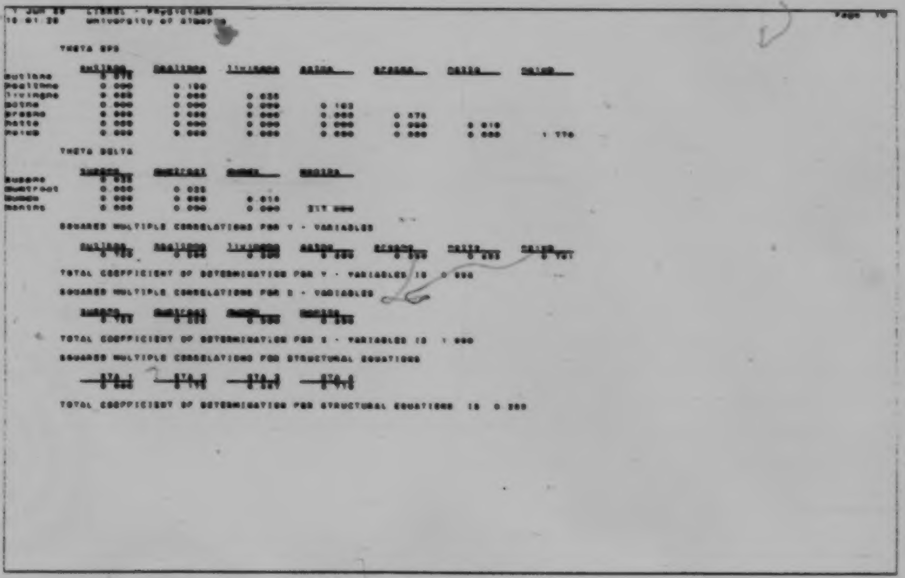
        LAMBDA X

        BETA

        GAMMA

        PHI

        PSI
```



```
[illegible]         LISREL - PHYSICIANS
[illegible]         University of Alberta

        THETA EPS

        THETA DELTA

        SQUARED MULTIPLE CORRELATIONS FOR Y - VARIABLES

        TOTAL COEFFICIENT OF DETERMINATION FOR Y - VARIABLES IS [illegible]

        SQUARED MULTIPLE CORRELATIONS FOR X - VARIABLES

        TOTAL COEFFICIENT OF DETERMINATION FOR X - VARIABLES IS [illegible]

        SQUARED MULTIPLE CORRELATIONS FOR STRUCTURAL EQUATIONS

        TOTAL COEFFICIENT OF DETERMINATION FOR STRUCTURAL EQUATIONS IS [illegible]
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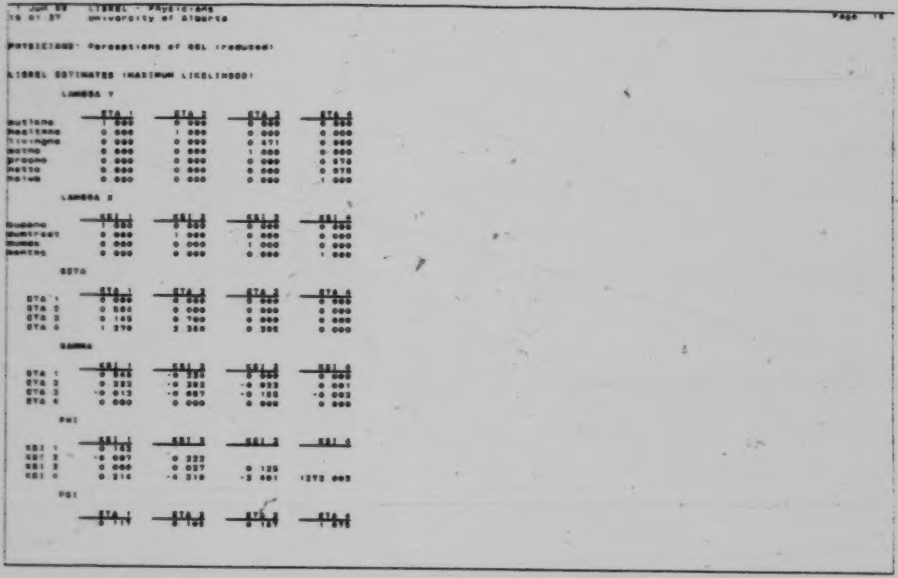

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            University of Alberta

PHYSICIANS' Perceptions of QOL (reduced)

LISREL ESTIMATES (MAXIMUM LIKELIHOOD)

        LAMBDA Y

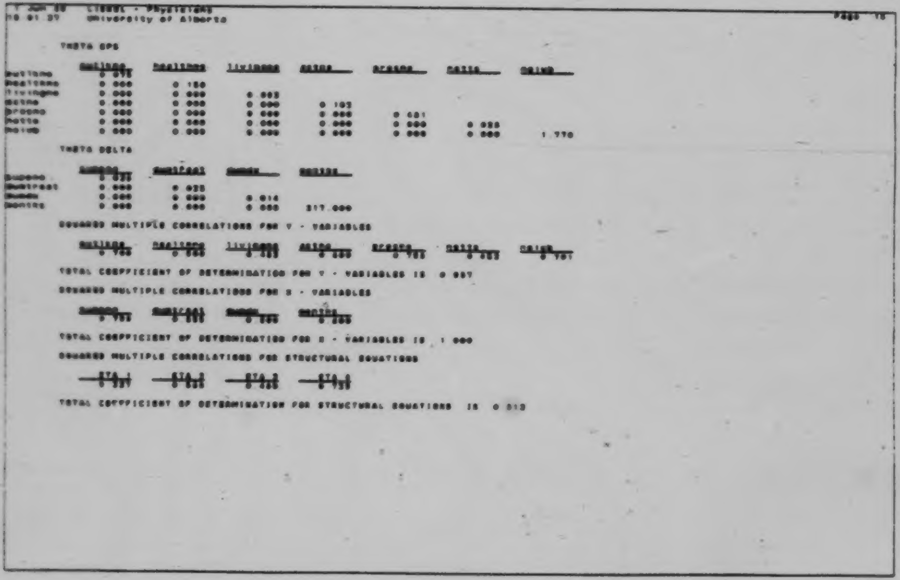
        LAMBDA X

        BETA

        GAMMA

        PHI

        PSI
```



```
            University of Alberta

        THETA EPS

        THETA DELTA

        SQUARED MULTIPLE CORRELATIONS FOR Y - VARIABLES

        TOTAL COEFFICIENT OF DETERMINATION FOR Y - VARIABLES IS

        SQUARED MULTIPLE CORRELATIONS FOR X - VARIABLES

        TOTAL COEFFICIENT OF DETERMINATION FOR X - VARIABLES IS  1.000

        SQUARED MULTIPLE CORRELATIONS FOR STRUCTURAL EQUATIONS

        TOTAL COEFFICIENT OF DETERMINATION FOR STRUCTURAL EQUATIONS  IS
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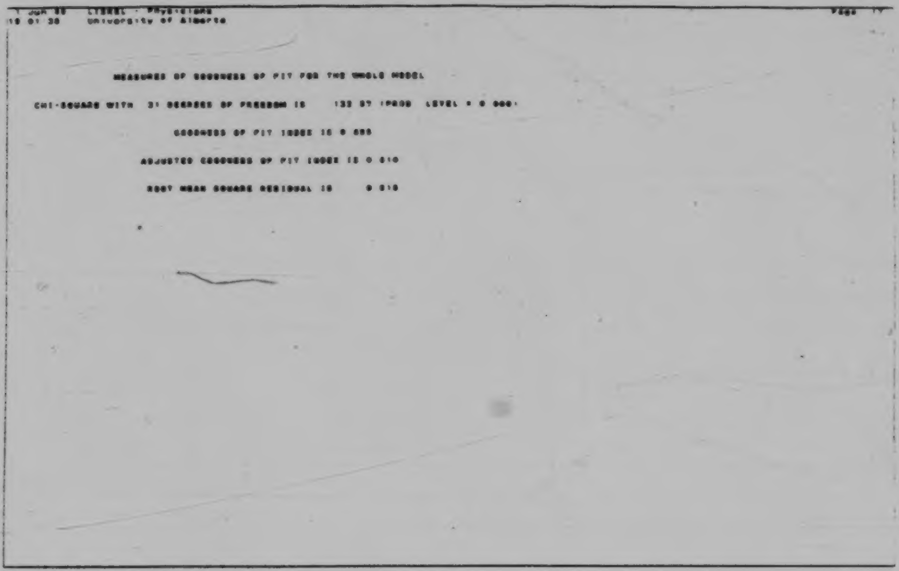

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1 JUN 89    LISREL - Physicians                                   Page [illegible]
10:01:38    University of Alberta

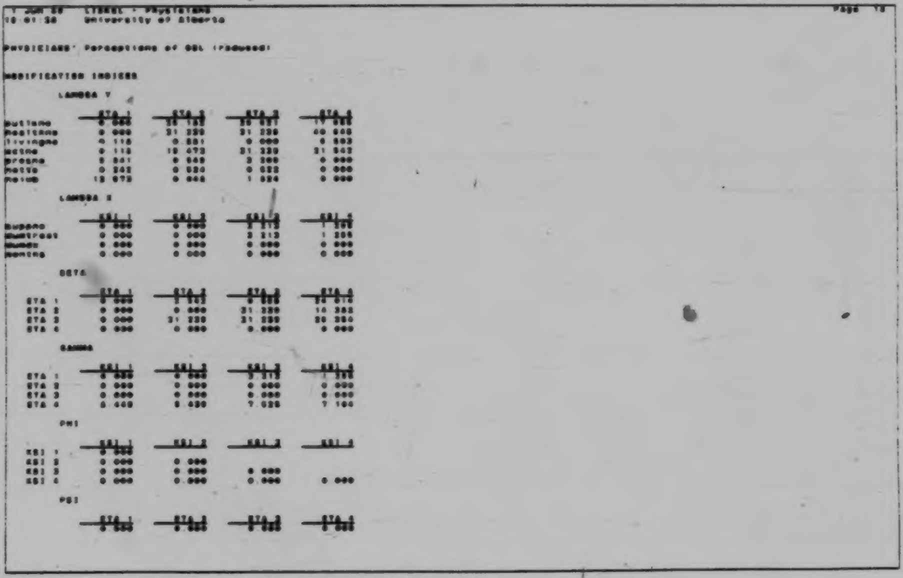
          MEASURES OF GOODNESS OF FIT FOR THE WHOLE MODEL

  CHI-SQUARE WITH [illegible] DEGREES OF FREEDOM IS [illegible] (PROB. LEVEL = 0.000)

                 GOODNESS OF FIT INDEX IS 0.[illegible]

           ADJUSTED GOODNESS OF FIT INDEX IS 0.[illegible]

           ROOT MEAN SQUARE RESIDUAL IS    0.[illegible]
```



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1 JUN 89    LISREL - Physicians                                   Page [illegible]
10:01:38    University of Alberta

PHYSICIANS' Perceptions of QOL (reduced)

MODIFICATION INDICES

        LAMBDA Y

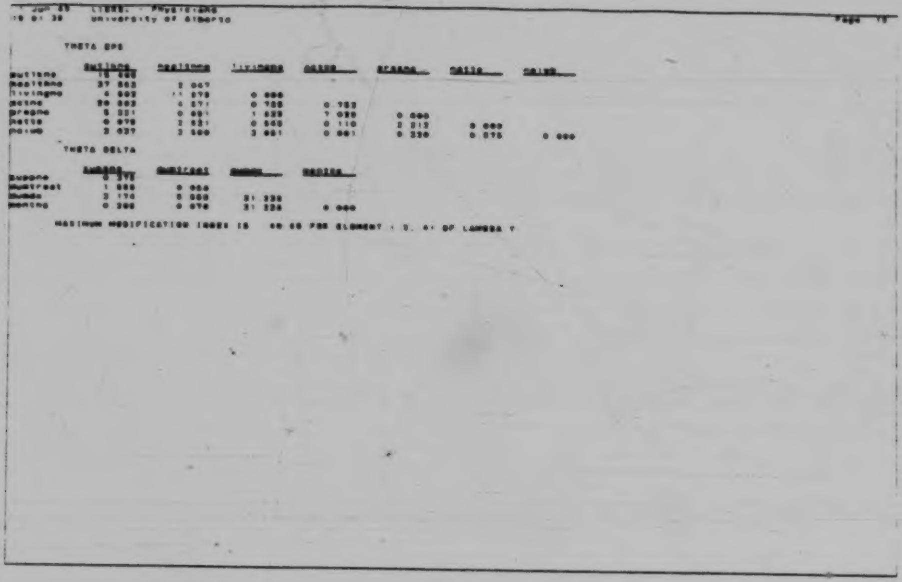
        LAMBDA X

        BETA

        GAMMA

        PHI

        PSI
```



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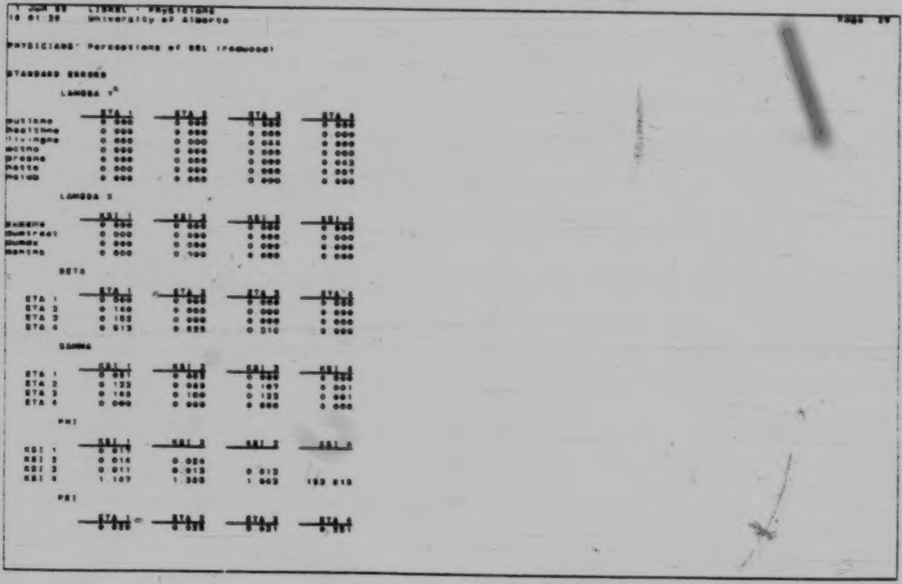
University of Alberta

THETA EPS

THETA DELTA

MAXIMUM MODIFICATION INDEX IS ... FOR ELEMENT ( 3, 4) OF LAMBDA Y
```



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LISREL - PHYSICIANS
University of Alberta

PHYSICIANS' Perceptions of SBL (Reduced)

STANDARD ERRORS

LAMBDA Y

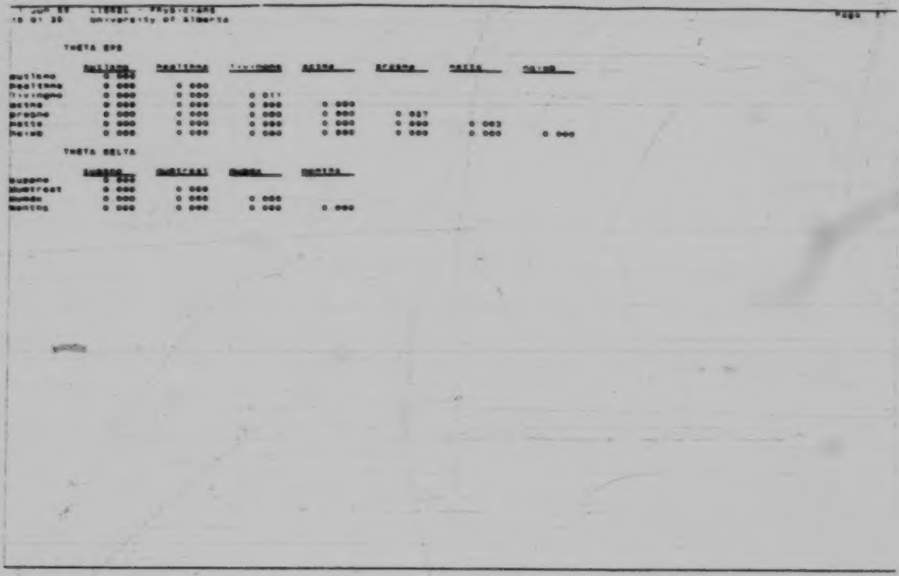
LAMBDA X

BETA

GAMMA

PHI

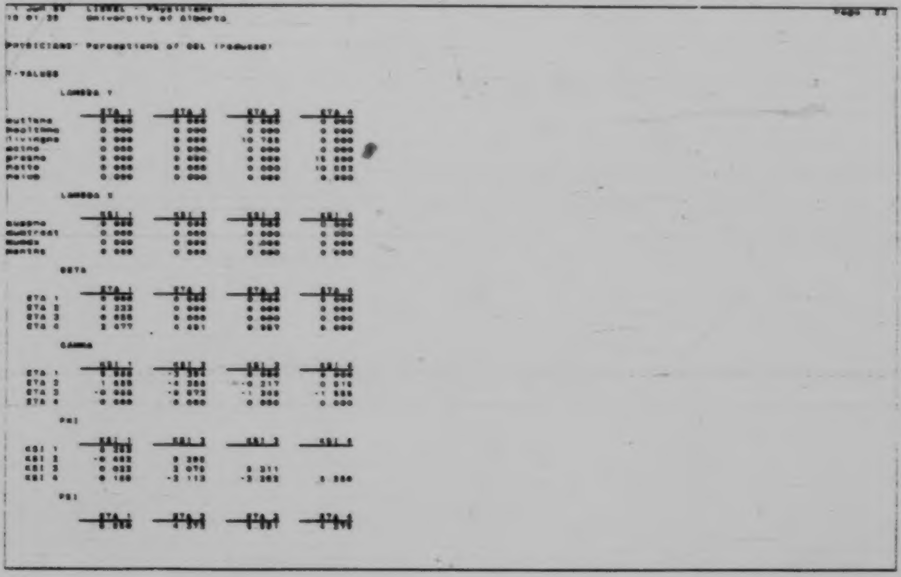
PSI
```



University of Alberta

THETA EPS

THETA DELTA



University of Alberta

T-VALUES

LAMBDA Y

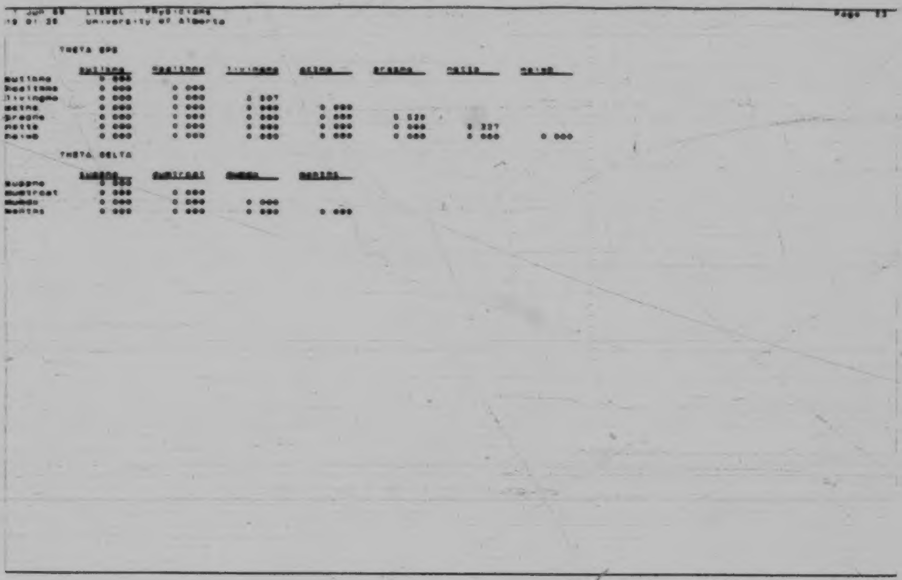
LAMBDA X

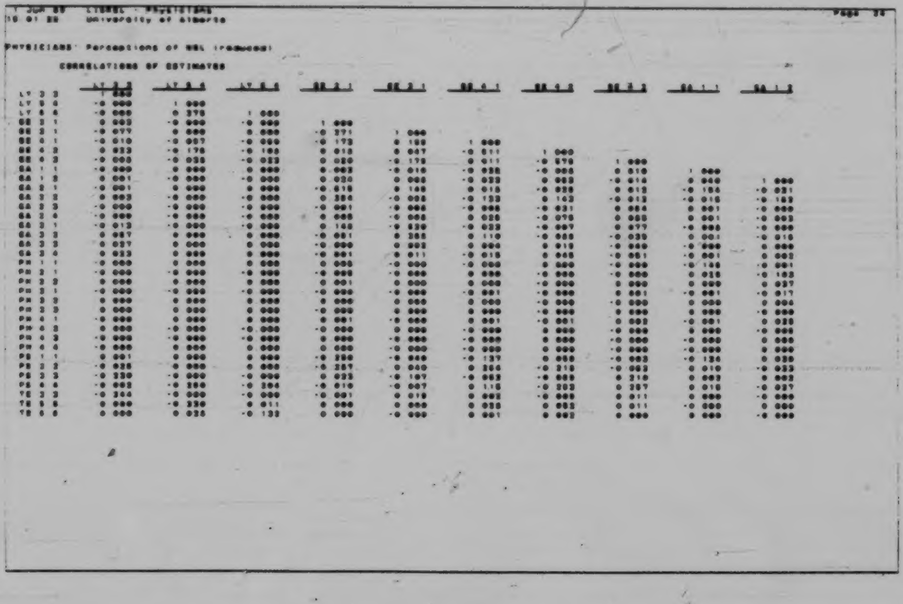
BETA

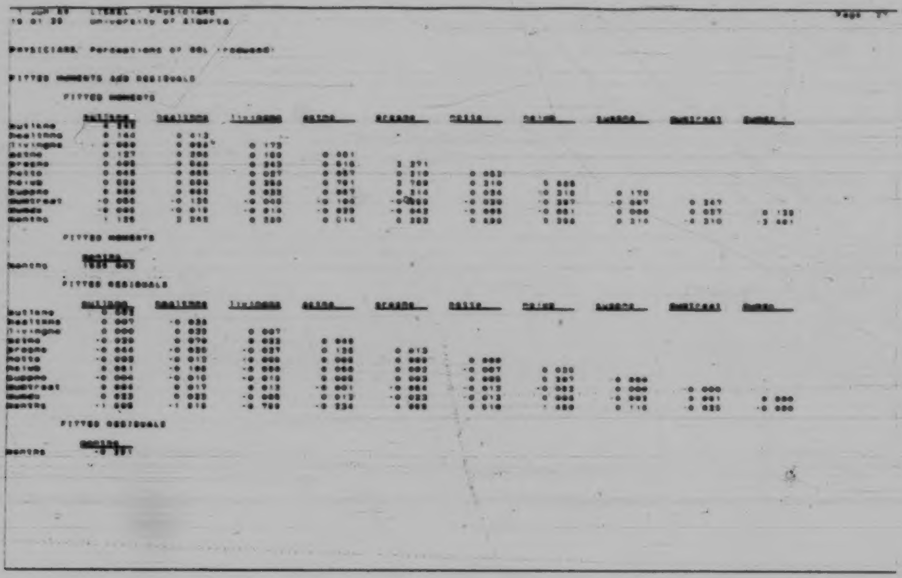
GAMMA

PHI

PSI







LISREL - PHYSICIANS

University of Alberta

PHYSICIANS: Perceptions of QOL (reduced)

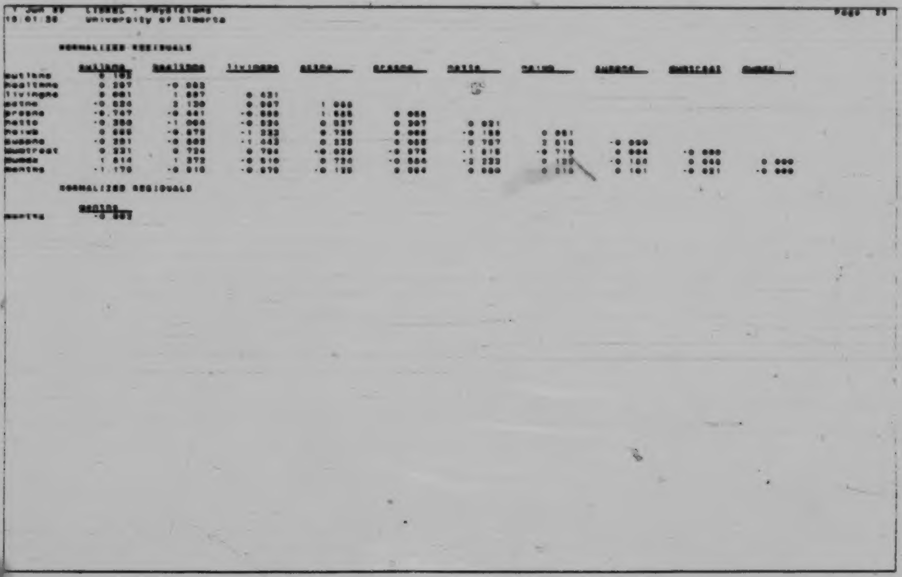
FITTED MOMENTS AND RESIDUALS

FITTED MOMENTS

FITTED MOMENTS

FITTED RESIDUALS

FITTED RESIDUALS



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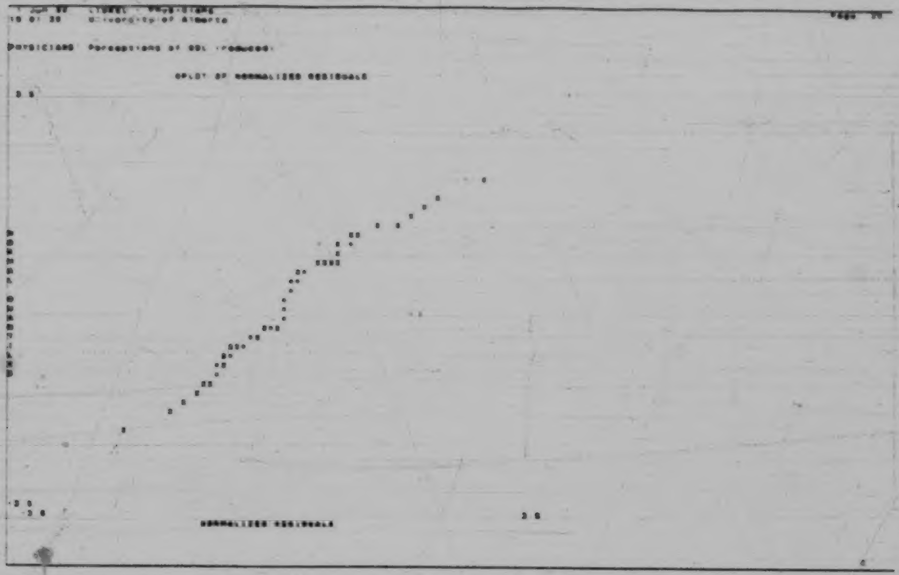
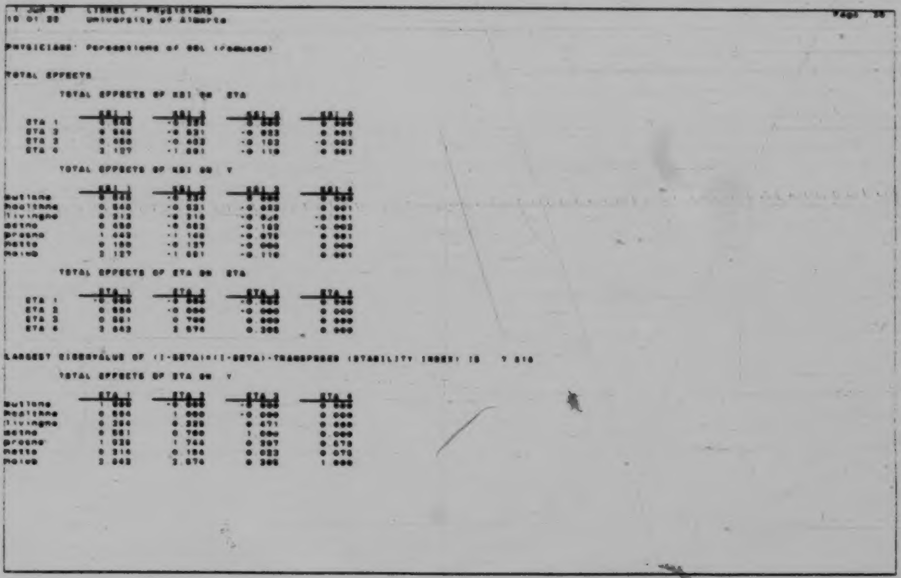
NORMALIZED RESIDUALS

NORMALIZED RESIDUALS




University of Alberta

PHYSICIANS' Perceptions of QOL (reduced)

TOTAL EFFECTS

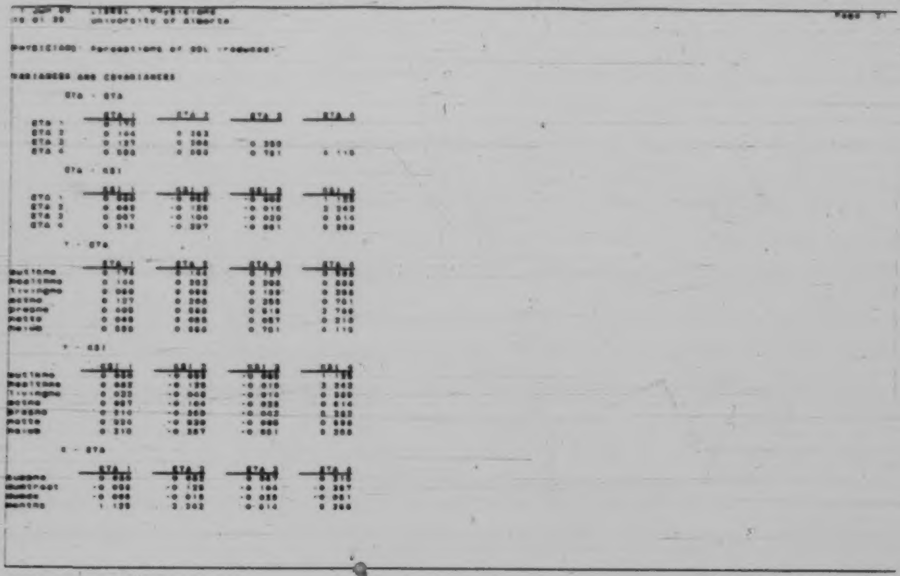
TOTAL EFFECTS OF KSI ON ETA

TOTAL EFFECTS OF KSI ON Y

TOTAL EFFECTS OF ETA ON ETA

LARGEST EIGENVALUE OF (I-BETA)*(I-BETA)-TRANSPOSED (STABILITY INDEX) IS

TOTAL EFFECTS OF ETA ON Y



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PHYSICIANS: Perceptions of QOL (reduced)

VARIANCES AND COVARIANCES

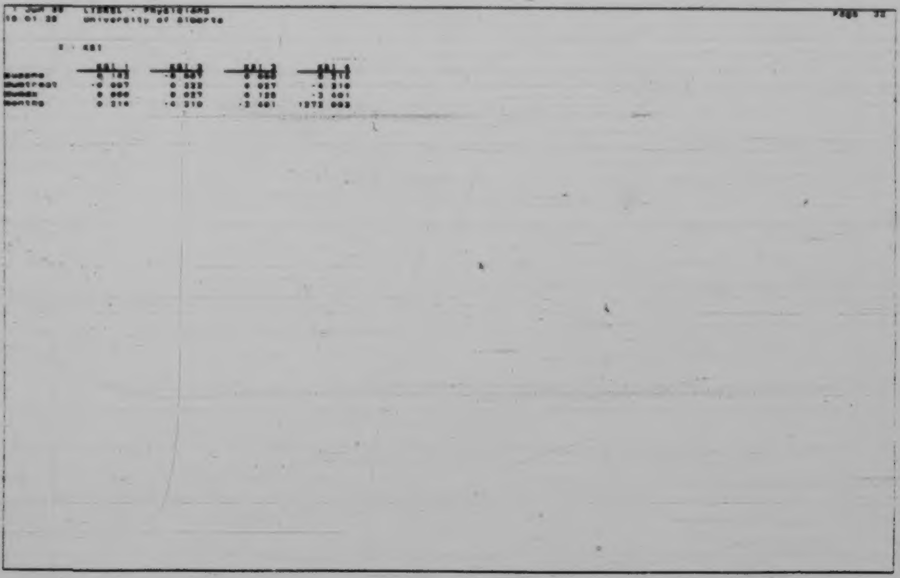
ETA - ETA

ETA - KSI

Y - ETA

Y - KSI

X - ETA



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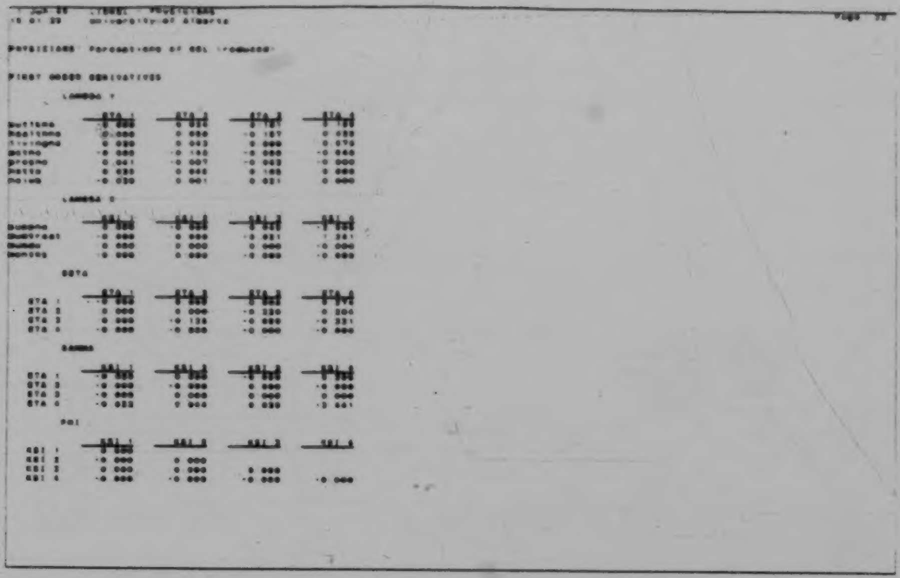
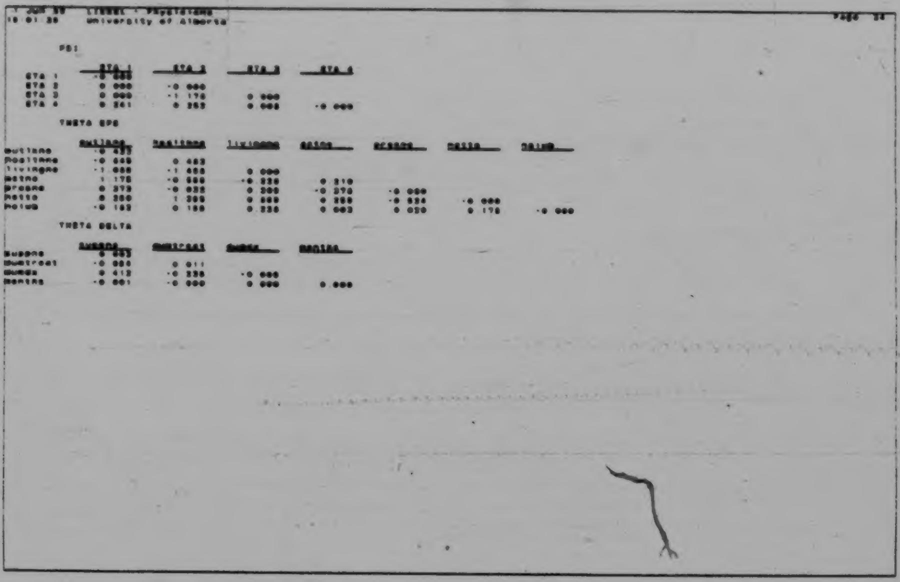
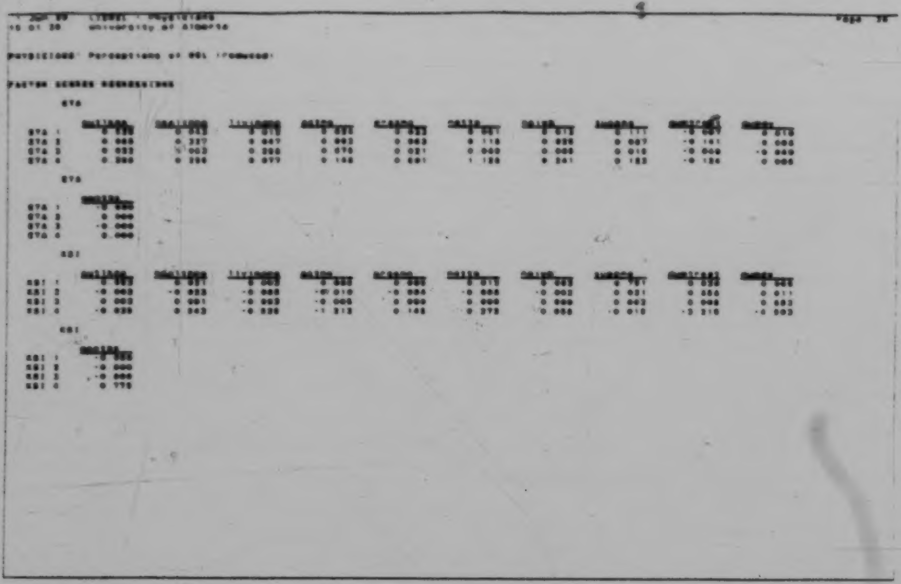
University of Alberta

X - KSI







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LISREL - Physicians
University of Alberta

PHYSICIANS' Perceptions of QOL (reduced)

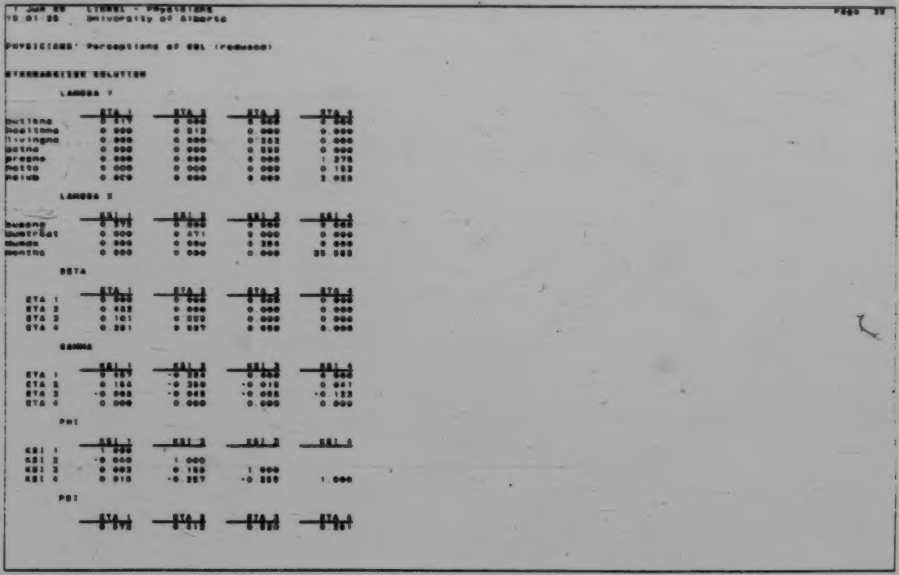
FACTOR SCORES REGRESSIONS

        ETA

        ETA

        KSI

        KSI
```



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LISREL - Physicians
University of Alberta

PHYSICIANS' Perceptions of QOL (reduced)

STANDARDIZED SOLUTION

        LAMBDA Y

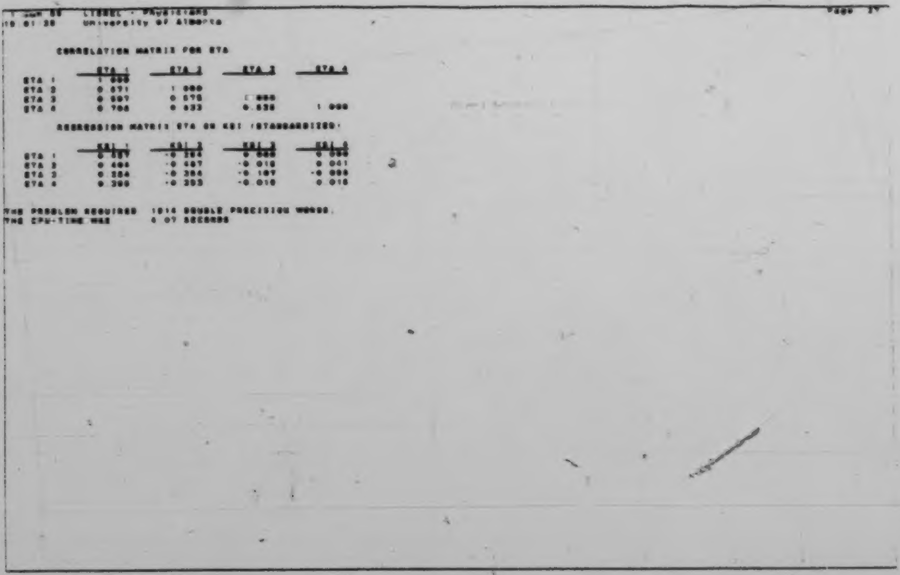
        LAMBDA X

        BETA

        GAMMA

        PHI

        PSI
```



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 7 JUN 88   LISREL - PHYSICIANS                                                            Page [illegible]
18:01:30    University of Alberta

      CORRELATION MATRIX FOR ETA

              ETA 1       ETA 2       ETA 3       ETA 4
 ETA 1        1.000
 ETA 2        0.671       1.000
 ETA 3        0.507       0.575       1.000
 ETA 4        0.704       0.633       0.536       1.000

      REGRESSION MATRIX ETA ON KSI (STANDARDIZED)

              KSI 1       KSI 2       KSI 3       KSI 4
 ETA 1        0.587      -0.284       0.000       0.000
 ETA 2        0.404      -0.407      -0.016       0.041
 ETA 3        0.384      -0.384      -0.107      -0.008
 ETA 4        0.380      -0.353      -0.018       0.018

THE PROBLEM REQUIRED  1014 DOUBLE PRECISION WORDS.
THE CPU-TIME WAS       4.07 SECONDS
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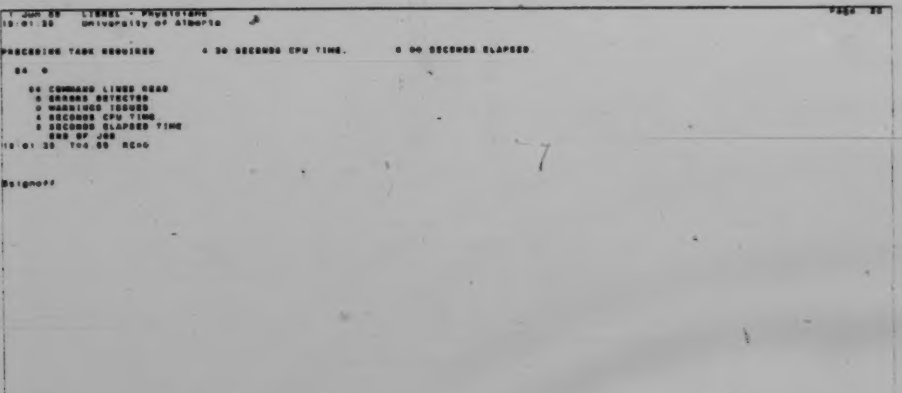

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 7 JUN 88   LISREL - PHYSICIANS                                                            Page [illegible]
18:01:30    University of Alberta

PRECEDING TASK REQUIRED       4.30 SECONDS CPU TIME.       8.00 SECONDS ELAPSED.

  84  0

    84 COMMAND LINES READ
     0 ERRORS DETECTED
     0 WARNINGS ISSUED
     4 SECONDS CPU TIME
     8 SECONDS ELAPSED TIME
       END OF JOB
18:01:30  T=4.30  READ

$signoff
```